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FLOOD PLAIN MANAGEMENT STUDY

GLENWOOD CITY

VILLAGE OF DOWNING

VILLAGE OF BOYCEVILLE

DUNN & ST. CROIX COUNTIES, WISCONSIN



PREPARED BY THE
UNITED STATES DEPARTMENT OF AGRICULTURE,
SOIL CONSERVATION SERVICE,
MADISON, WISCONSIN
IN COOPERATION WITH
DUNN COUNTY, WISCONSIN
ST. CROIX COUNTY, WISCONSIN
AND THE
WISCONSIN DEPARTMENT OF NATURAL RESOURCES
APRIL 1984

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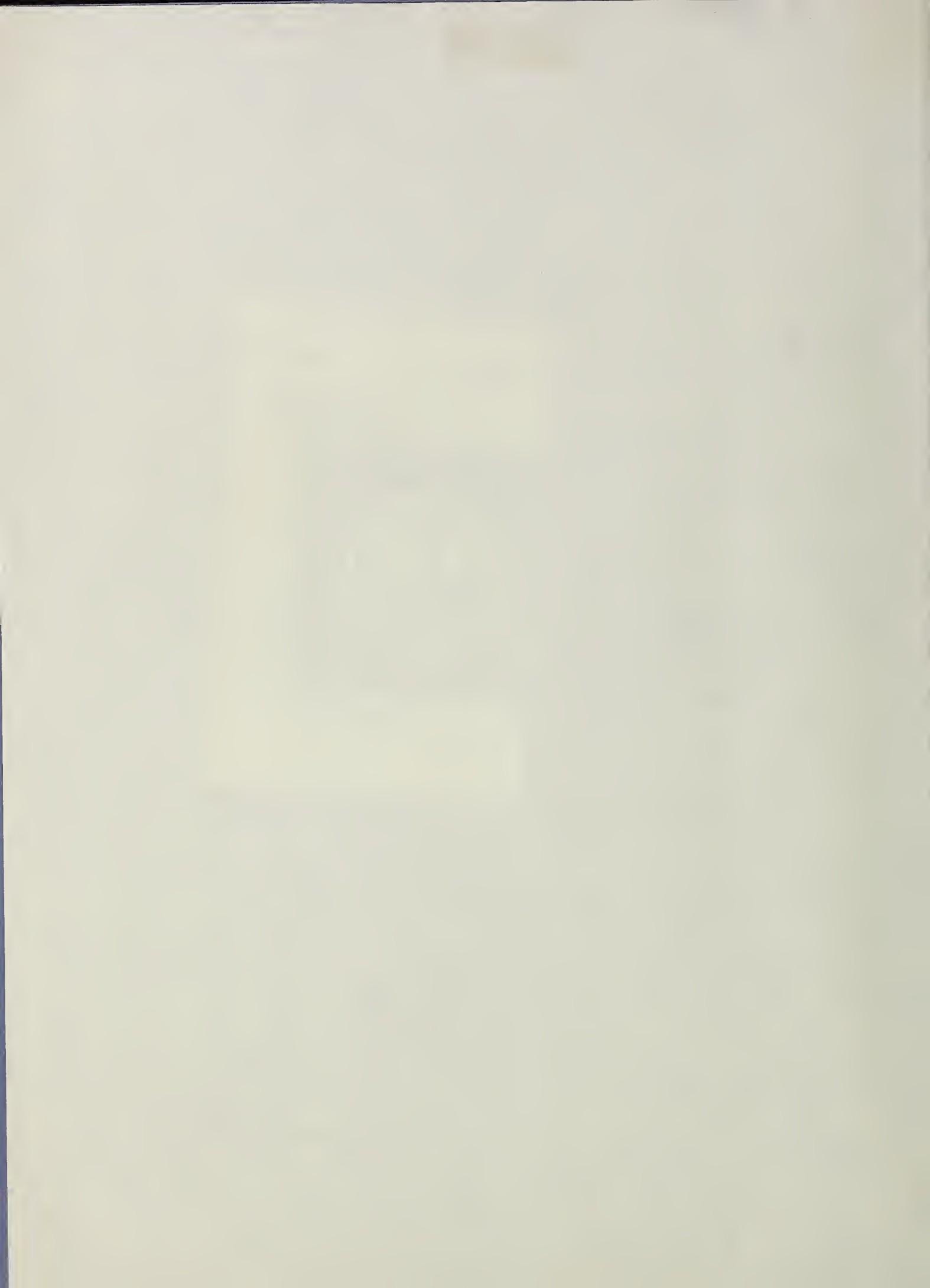
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Glenwood City, Downing, Boyceville,
Dunn County and St. Croix County
Flood Hazard Study

Introduction

The purpose of this study is to define the flood characteristics of Tiffany and Beaver Creeks in Glenwood City, Downing, and Boyceville in Dunn and St. Croix Counties. The study was requested through the Dunn and St. Croix Counties and the Wisconsin Department of Natural Resources (DNR). The information acquired will enable them to develop an effective flood plain management program.

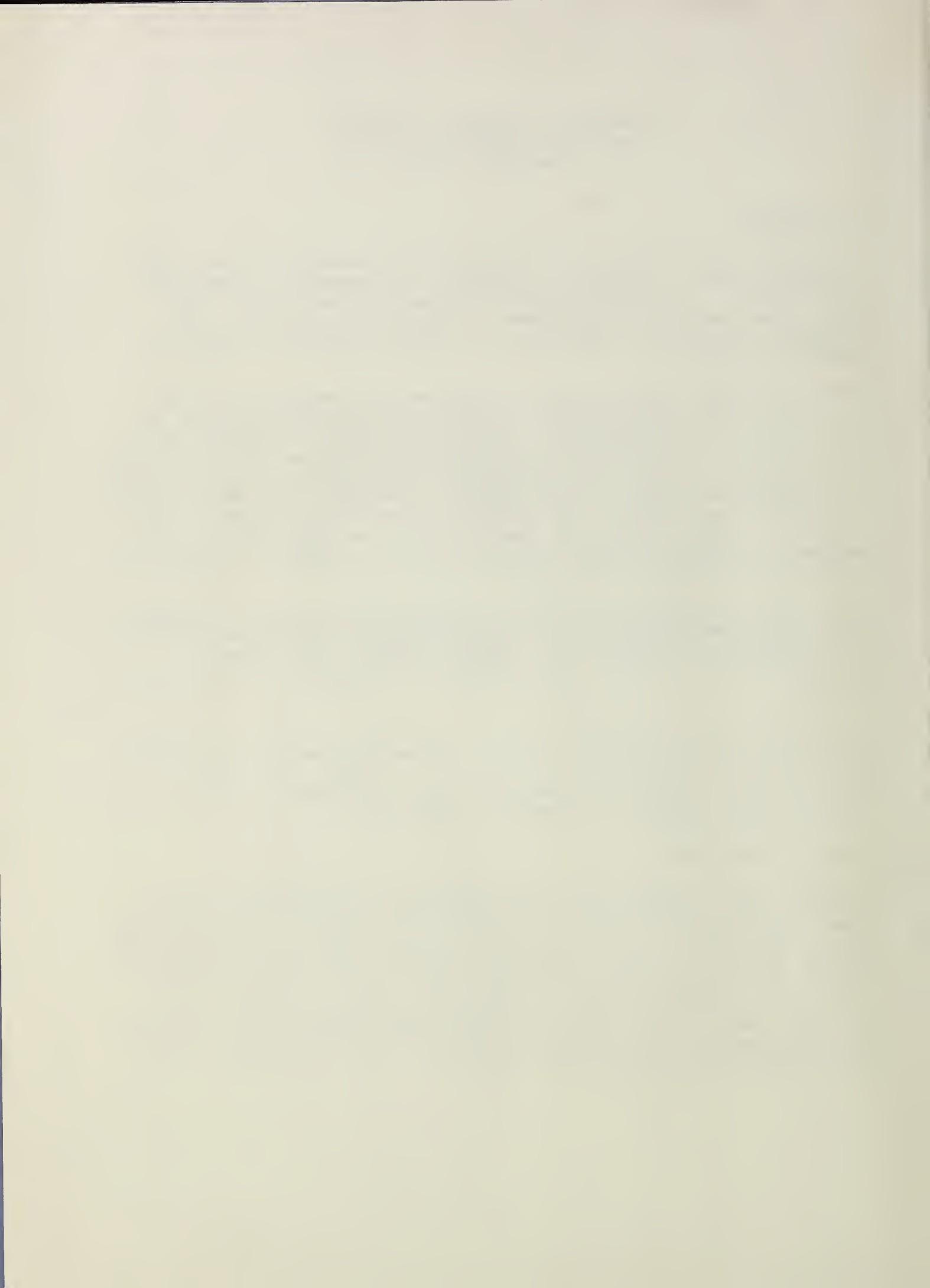
Tiffany and Beaver Creeks are part of the Glen Hills watershed, a PL-566 project where the last floodwater retarding structure was completed in the fall of 1975. The watershed has a limited term structure maintenance agreement and there is a possibility the structures could be removed in the future. It was agreed to use the 100-year frequency flood plain with the dams in place as the regulated floodway and the additional flood plain required to carry the 100-year frequency flood with the structures removed as the regulated flood fringe. The report contains the floodway and the two flood plains on the photomaps, profiles, and charts except for the two tributaries in Boyceville which show the 100-year flood plain.

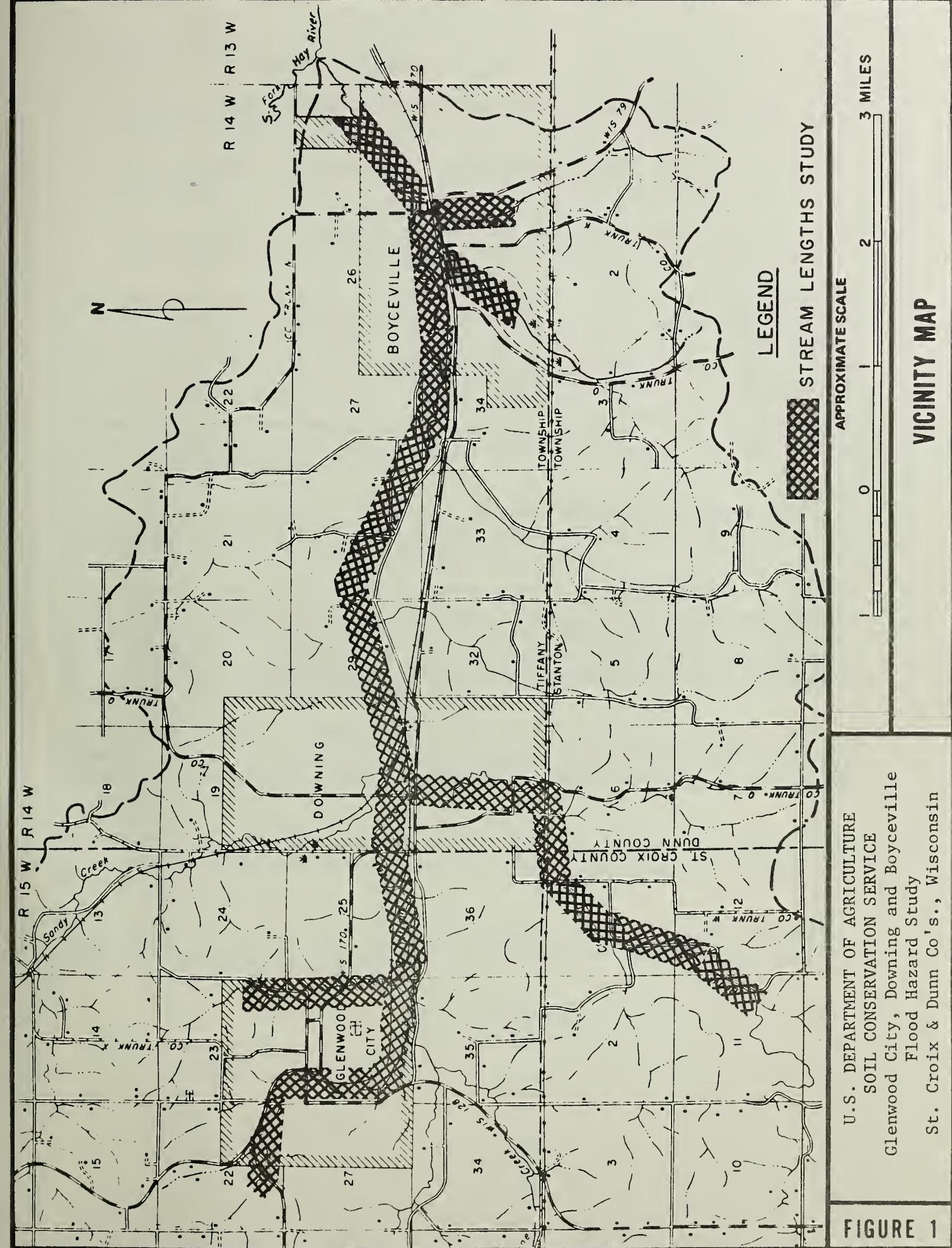
The Soil Conservation Service carries out flood hazard studies in accordance with Federal Level Recommendation 3 of "A Unified National Program for Flood Plain Management," and Section 6 of Public Law 83-566. The principles contained in Executive Order 11988, Flood Plain Management, are addressed in this part.

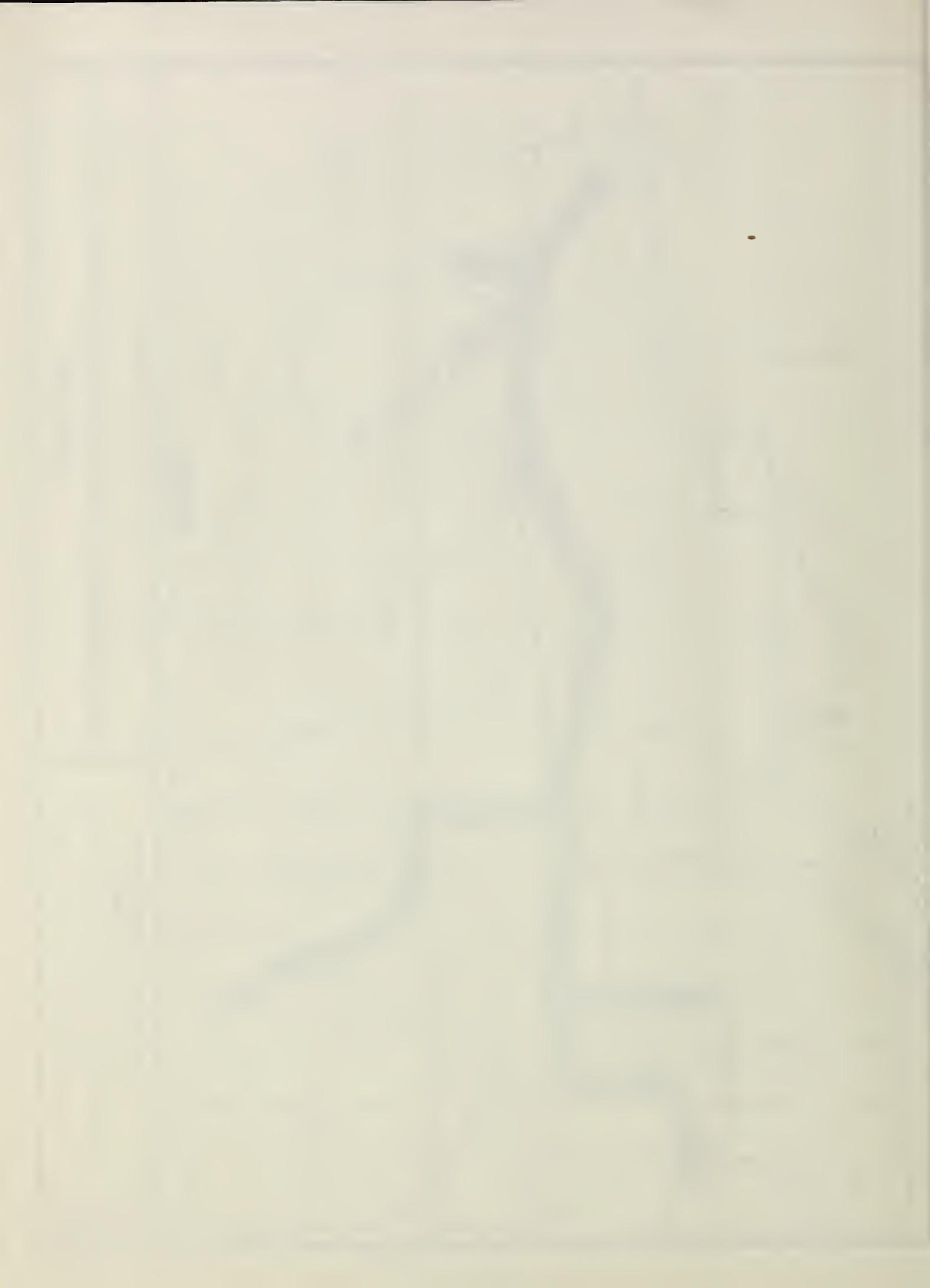
In Wisconsin the Soil Conservation Service coordinates flood hazard studies with the Wisconsin DNR, through a joint coordination agreement entered into in October 1978. The Wisconsin Water Resources Act (Chapter 614, Laws of Wisconsin, 1965) authorizes the DNR, Division of Enforcement, to establish and upgrade minimum standards for flood plain regulations.

Study Area Description

The study area is in Dunn and St. Croix Counties in west-central Wisconsin. The watershed is fan-shaped and about equally divided into three tributary areas: Beaver Creek in the south, Tiffany Creek in the west, and Sandy Creek in the north. The confluence of these streams is at Downing, a village at the Dunn-St. Croix county line. Beaver Creek has two flood retarding structures of which one is a multi-purpose structure which forms Glen Lake. Tiffany Creek has six floodwater retarding structures above the confluence of Beaver and Sandy Creeks of which three are directly above Glenwood City. Sandy Creek has two floodwater retarding structures and one natural impoundment (Bushy Lake) outletted through a railroad culvert.







The following reaches were studied:

Tiffany Creek from site 5 above Glenwood City to the downstream city limits of Boyceville, 14.41 miles.

Beaver Creek from Glen Lake to its confluence with Tiffany Creek, 6.07 miles.

Glenhaven Creek to site 6, 1.14 miles, Boyceville West drainageway, 0.74 miles and Boyceville East drainageway, 0.65 miles.

The combined drainage area below structures 4 and 5, Upper Tiffany Creek, is 2.8 square miles. Tiffany Creek at Downing has a drainage area of 17.02 square miles. Beaver Creek at Downing has a drainage area of 17.80 square miles. Sandy Creek has a drainage area of 17.61 square miles. The unnamed tributary below structure no. 6 has a drainage area of 1.68 square miles. Boyceville West drainageway has a drainage area of 2.8 square miles. Boyceville East drainageway has a drainage area of 2.12 square miles. The total drainage area of Tiffany Creek is 69.63 square miles. Tiffany Creek is in USGS Hydrologic Unit 07050007.

The climate is typically continental. January temperatures average 14°F. July, the warmest month, has an average temperature of 73°F. Precipitation averages 29 inches per year. (Reference 6)

Tiffany Creek lies in the glaciated area in west-central Wisconsin. The topography is characterized by moderately rolling uplands, relatively steep valley slopes, and broad flat flood plains. These uplands are at mean sea level elevations of nearly 1,300 feet. Slopes extending from the ridges to the valley floors vary from 15 to 40 percent throughout the watershed with the more abrupt slopes located in Beaver Creek.

Upland soils in Beaver Creek consist of Freer, Sargeant, and Vlasaty silt loams, which are in hydrologic group C. Upland soils in the Tiffany and Sandy Creek areas consist of Santiago, Freeon, and Otterholt silt loams, which are in hydrologic group B.

The flood plain soils are alluvial bottom land soils subject to frequent overflow and consist of Meridian loams and fine sandy loams and Kato and Ettrick silt loams.

Cover in the watershed is good. The agricultural economy in the watershed is primarily dairying with large amounts of forage being required. Land use in Glen Hills watershed is as follows:

	<u>Percent</u>
Cropland	45
Woodland	12
Pasture	30
Idle	5
Other - Roads, urban	8
Total	100

Natural and Beneficial Flood Plain Values

The undeveloped portion of the study area consists primarily of cropland and pastureland interspersed with scattered woodlots, wetlands, and idle meadows. The cropland is used to produce corn, alfalfa, and soybeans. Some of the soils in the flood plain are considered prime agricultural soils. Most of the pasture is unimproved bluegrass or canarygrass. Wooded areas are mainly silver maple, red maple, box elder, basswood, cottonwood, and willow. The idle meadows are a mixture of forbs and grasses. Goldenrod, ragweed, milkweed, timothy, bluegrass, and bromegrass are common species in these areas.

Because of the diversity of land-cover types, the study area provides good habitat for a wide range of wildlife species including raccoon, grey and red fox, striped skunk, grey and fox squirrel, mink, muskrat, cottontail rabbit, and white-tailed deer. There are also ring-necked pheasants, and a wide variety of songbirds, hawks, owls, and waterfowl.

Tiffany Creek and its tributaries, Sandy Creek and Beaver Creek, are classified by the Wisconsin Department of Natural Resources as Class II trout streams. Overpastured streambanks and sediment runoff limit their potential.

There is good opportunity for environmental enhancement through a stream corridor management program which could include streambank fencing, improved livestock crossings, and grass and tree plantings. This would result in better water quality, as well as an improvement of fish and wildlife habitat.

Along with producing crops, forage for livestock, wood products, and wildlife, the entire flood plain provides a broad area to spread out and temporarily store floodwaters. The slowing of runoff across the flood plain allows additional time for the runoff to infiltrate and recharge the ground water.

The Wisconsin DNR does not have any record of the presence of any threatened or endangered plant or animal species in the study area.

There are no sites on the National Register of Historic Places.

Tiffany Creek is not on the Department of Interior Nationwide Rivers Inventory.

Flooding Problems

Extensive floodwater damage occurred in 1934, 1942, and 1954 during the growing season. A severe flood occurs in the watershed about once every 12 years. Two state highway bridges were destroyed in 1934. Another state highway bridge was destroyed in 1942, and two county highway bridges in 1954. Glenwood City also suffered considerable damages in 1954. Small floods in tributary areas have occurred as often as five times in one year. One Sunday, April 27, 1975, a rainstorm of 3 to 7 inches (obtained from a bucket survey) caused some of the structures to operate at near capacity. No significant flood damages were noted although the creeks were out of their banks.

Existing Flood Plain Management

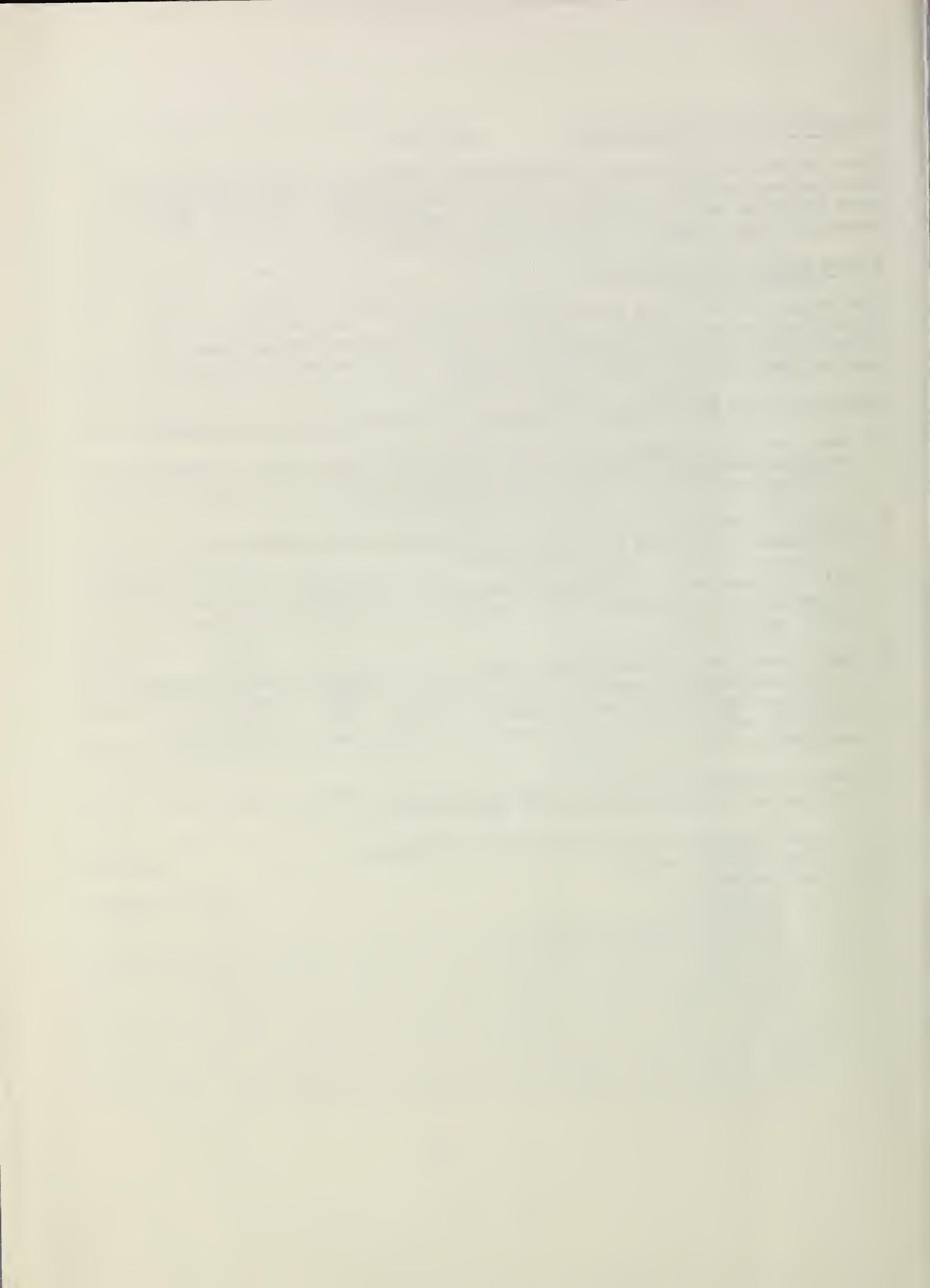
Dunn and St. Croix Counties, Glenwood City, and Boyceville have approved flood plain zoning ordinances but no detailed flood plain maps. They are operating with the flood hazard maps issued by HUD. Downing has no ordinance. All areas are in the emergency flood insurance program.

Future Flood Plain Management

The results of this flood plain management study will be incorporated into a flood plain zoning ordinance which will provide standards for all development in the flood fringe and restrict development in the floodway to minimize adverse impact on life, health, and property.

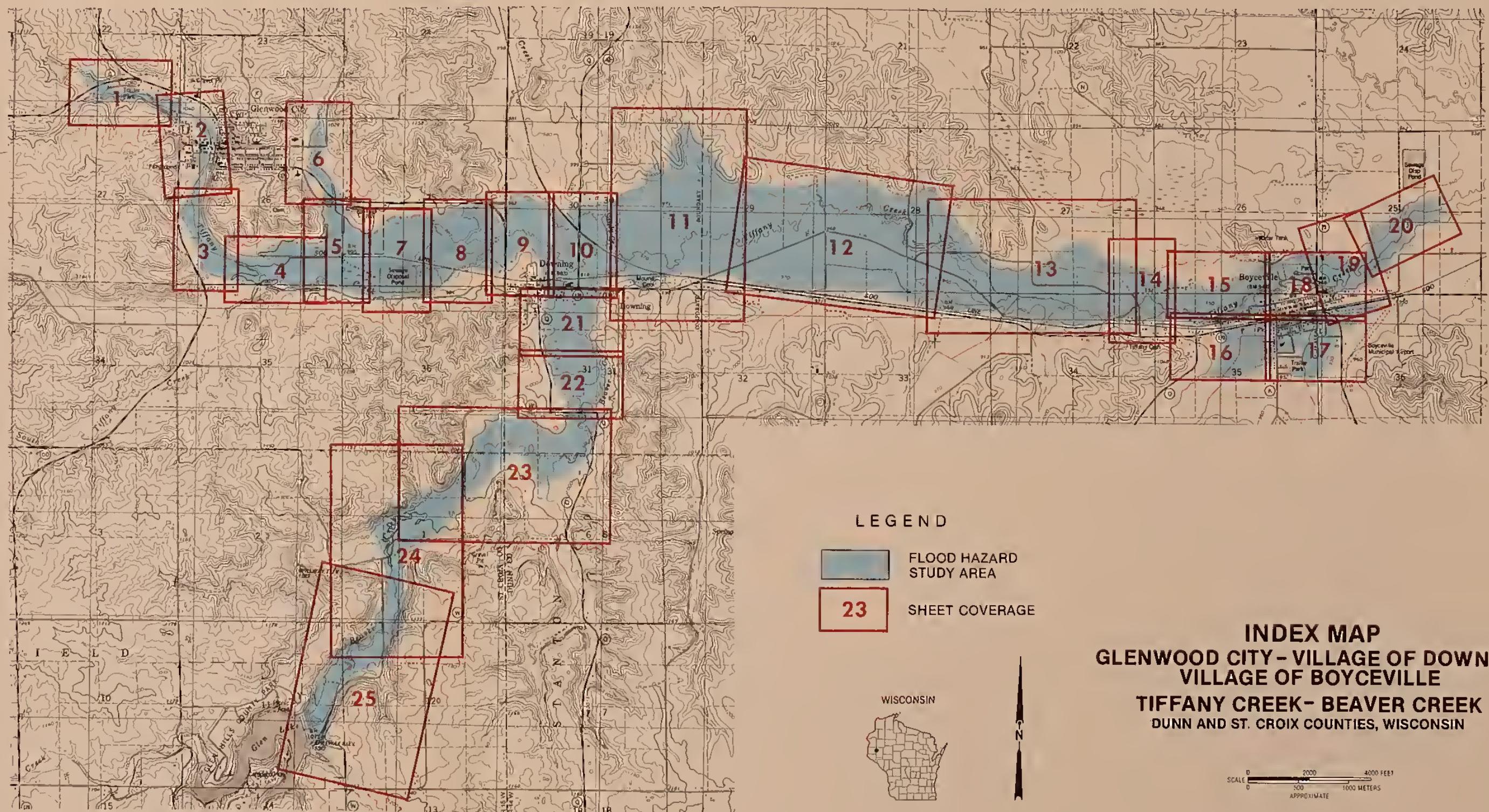
Alternatives for Mitigating Flood Damages to Existing and Future Development

- A. Apply existing standards set forth in the subdivision control ordinance to regulate development in nonsuitable areas and minimize erosion and diffused surface water runoff within the watershed.
- B. Establish conservancy districts for those areas highly conducive to erosion and unsuitable for development.
- C. Relocate homes in the floodway and flood proof those existing homes in the flood fringe by elevating, filling basements, and providing dry land access during floods.
- D. Modify and improve stream channel and bridge and culvert capacity throughout the watershed or construct levees, dikes, and dams to confine 100-year floodflows within the stream channel or floodway. This alternative may have high installation and maintenance costs which should be thoroughly evaluated.
- E. Provide a reservoir monitoring system for the dams above Glenwood City. The proposal should include but not be limited to:
 1. Specifications for monitoring and warning devices.
 2. Communications network.
 3. Cost estimate for:
 - a. installation
 - b. operation and maintenance.



Appendix A

FLOOD BOUNDARY MAPS







FLOODWAY
FLOODPLAIN (WITH STRUCTURES)
FLOODPLAIN (WITHOUT STRUCTURES)

X RM 9
AX

REFERENCE MARK
CROSS SECTION LOCATION

STREAM FLOW
SCALE
0 200 400 FEET
0 50 100 METERS
APPROXIMATE

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
FLOOD PLAIN MANAGEMENT STUDY
DUNN AND ST. CROIX COUNTIES, WISCONSIN

FLOOD HAZARD AREA

GLENWOOD CITY - TIFFANY CREEK



FLOODWAY

FLOODPLAIN (WITH STRUCTURES)

FLOODPLAIN (WITHOUT STRUCTURES)

LEGEND

X RM 9

REFERENCE MARK

AX

CROSS SECTION LOCATION

STREAM FLOW

SCALE 0 200 400 FEET
0 50 100 METERS

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DUNN AND ST. CROIX COUNTIES, WISCONSIN

FLOOD HAZARD AREA

GLENWOOD CITY - TIFFANY CREEK





FLOODWAY

FLOODPLAIN (WITH STRUCTURES)

FLOODPLAIN (WITHOUT STRUCTURES)

LEGEND

X RM 9 REFERENCE MARK

AX CROSS SECTION LOCATION

STREAM FLOW

SCALE 0 200 400 FEET
0 50 100 METERS

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FLOOD HAZARD AREA

GLENWOOD CITY - TIFFANY CREEK



MATCH TO SHEET 3

GLENWOOD CITY

CITY LIMITS

Tiffany

Soo

Line

Railroad

BN

BM

MATCH TO SHEETS

Creek

A B

FLOODWAY

FLOODPLAIN (WITH STRUCTURES)

FLOODPLAIN (WITHOUT STRUCTURES)

LEGEND

X RM 9

REFERENCE MARK

AX

CROSS SECTION LOCATION

STREAM FLOW

SCALE 0 200 400 FEET

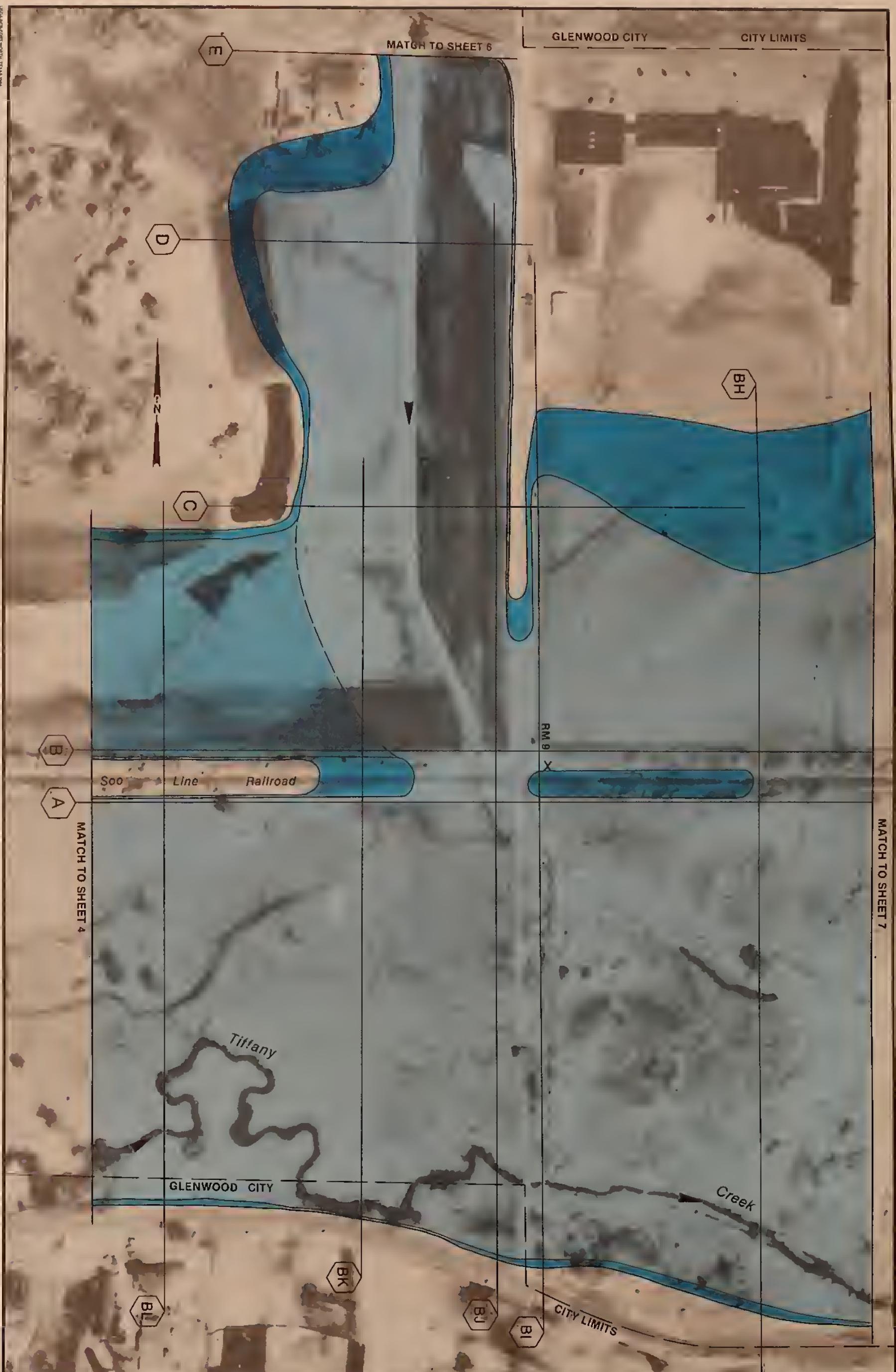
0 50 100 METERS APPROXIMATE

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FLOOD HAZARD AREA

GLENWOOD CITY - TIFFANY CREEK





FLOODWAY	LEGEND	STREAM FLOW
FLOODPLAIN (WITH STRUCTURES)	X RM 9 REFERENCE MARK	0 200 400 FEET
FLOODPLAIN (WITHOUT STRUCTURES)	CROSS SECTION LOCATION AX	0 50 100 METERS

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FLOOD HAZARD AREA

GLENWOOD CITY - TIFFANY CREEK





FLOOWAY
FLOOPLAIN (WITH STRUCTURES)
FLOOPLAIN (WITHOUT STRUCTURES)

LEGEND
X RM 9 REFERENCE MARK
AX CROSS SECTION LOCATION

STREAM FLOW
SCALE 0 200 400 FEET
0 50 100 METERS APPROXIMATE

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FLOOD HAZARD AREA
GLENWOOD CITY-GLENHAVEN CREEK





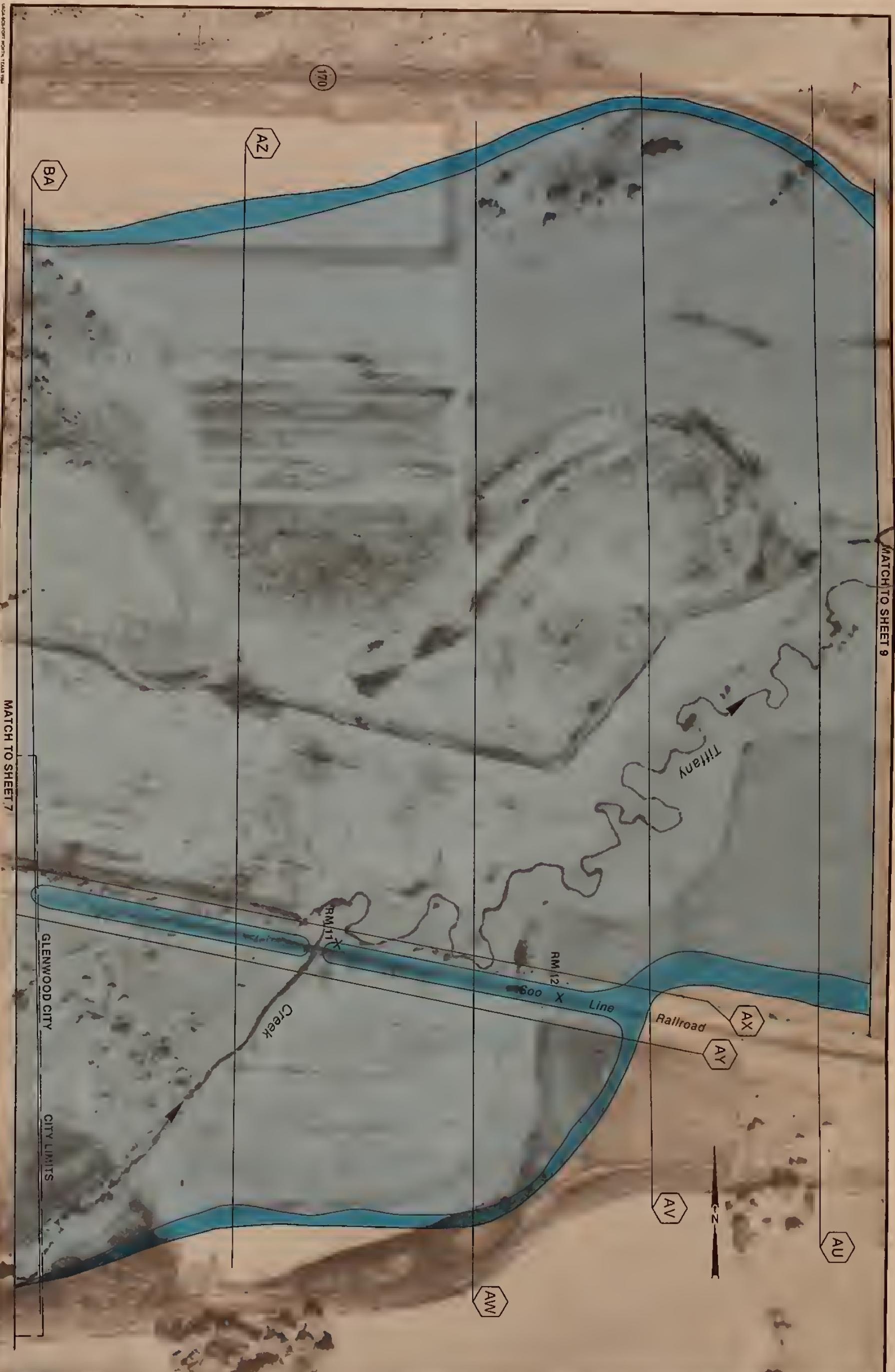
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FLOOD HAZARD AREA

GLENWOOD CITY - TIFFANY CREEK



MATCH TO SHEET 9



FLOODWAY

FLOODPLAIN (WITH STRUCTURES)

FLOODPLAIN (WITHOUT STRUCTURES)

LEGEND

X RM 9

REFERENCE MARK

AX

CROSS SECTION LOCATION

STREAM FLOW

SCALE
0 200 400 FEET
0 50 100 METERS

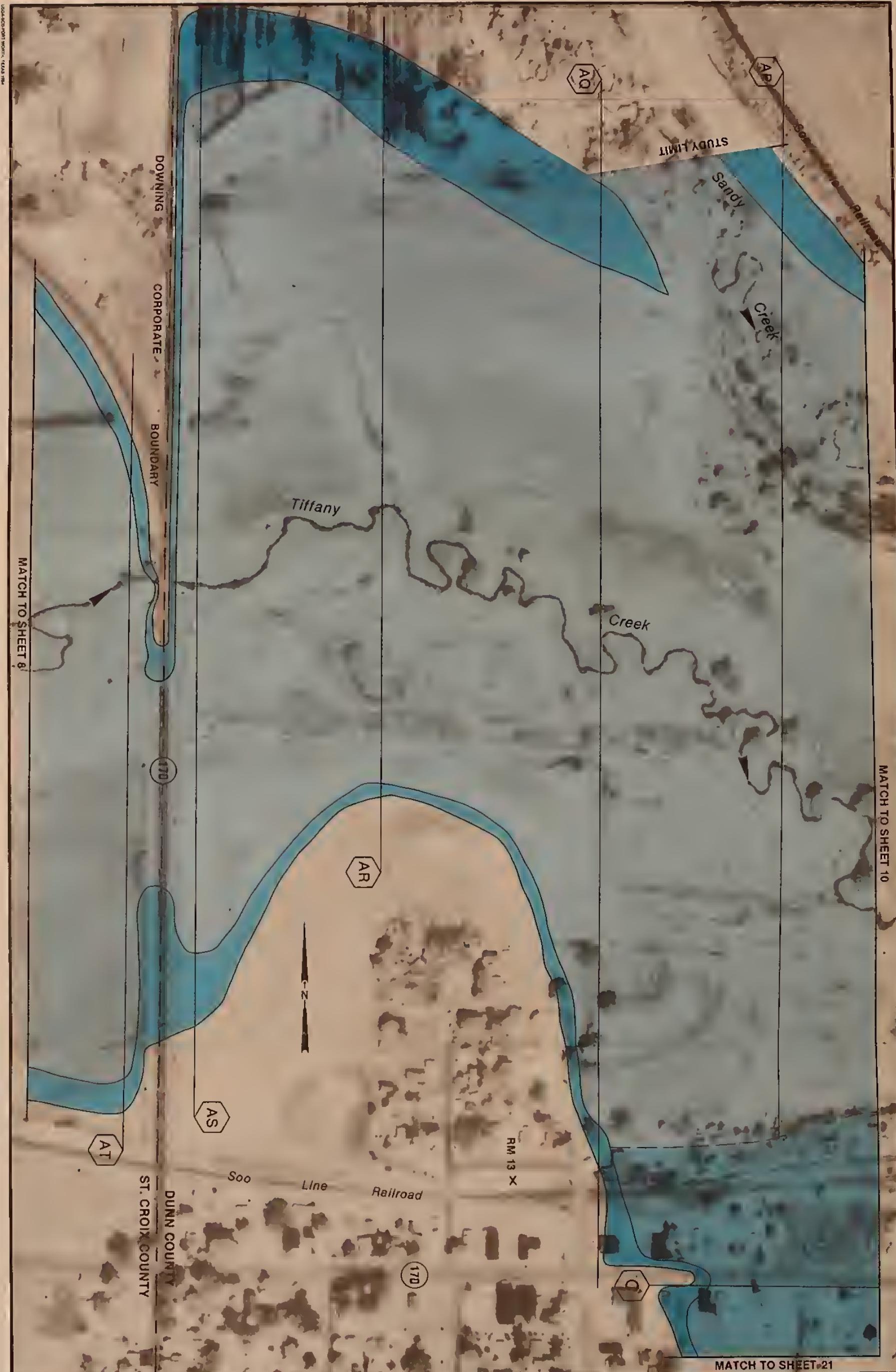
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FLOOD HAZARD AREA

GLENWOOD CITY - TIFFANY CREEK





FLOODWAY
FLOODPLAIN (WITH STRUCTURES)
FLOODPLAIN (WITHOUT STRUCTURES)

X RM 9 REFERENCE MARK
AX CROSS SECTION LOCATION

STREAM FLOW
SCALE 0 200 400 FEET
0 50 100 METERS
APPROXIMATE

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FLOOD HAZARD AREA

VILLAGE OF DOWNING - TIFFANY CREEK





FLOODWAY

FLOODPLAIN (WITH STRUCTURES)

FLOODPLAIN (WITHOUT STRUCTURES)

LEGEND

X RM 9

REFERENCE MARK

AX

CROSS SECTION LOCATION

STREAM FLOW

SCALE 0 200 400 FEET

0 50 100 METERS

APPROXIMATE

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DUNN AND ST. CROIX COUNTIES, WISCONSIN

FLOOD HAZARD AREA

VILLAGE OF DOWNING - TIFFANY CREEK





FLOODWAY

FLOODPLAIN (WITH STRUCTURES)

FLOODPLAIN (WITHOUT STRUCTURES)

LEGEND

X RM 9

REFERENCE MARK

AX

CROSS SECTION LOCATION

STREAM FLOW

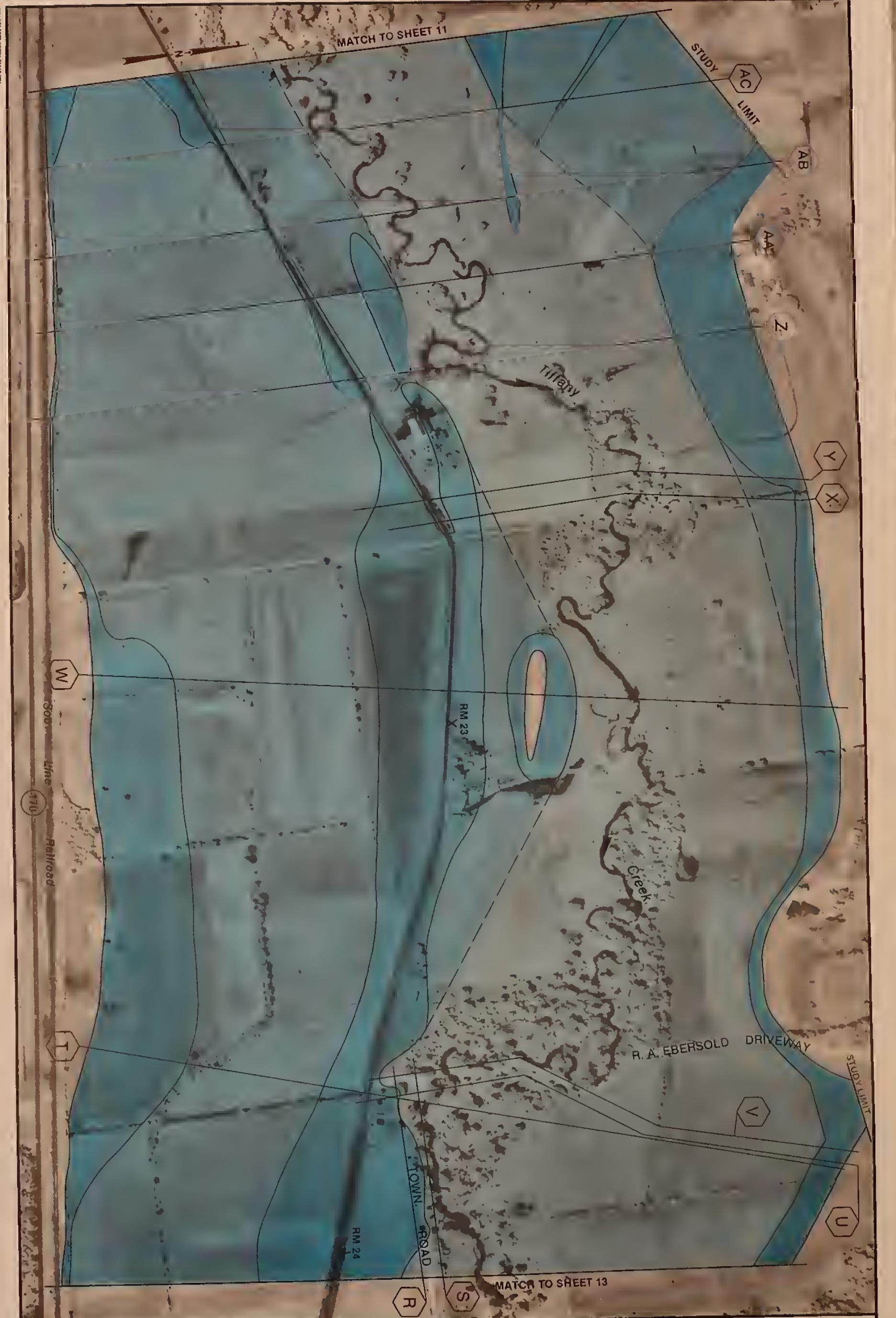
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FLOOD HAZARD AREA

TIFFANY CREEK





FLOODWAY

FLOODPLAIN (WITH STRUCTURES)

FLOODPLAIN (WITHOUT STRUCTURES)

X RM 9 REFERENCE MARK

AX CROSS SECTION LOCATION

STREAM FLOW
SCALE 0 400 800 FEET
0 100 200 METERS
APPROXIMATE

LEGEND

MATCH TO SHEET 13

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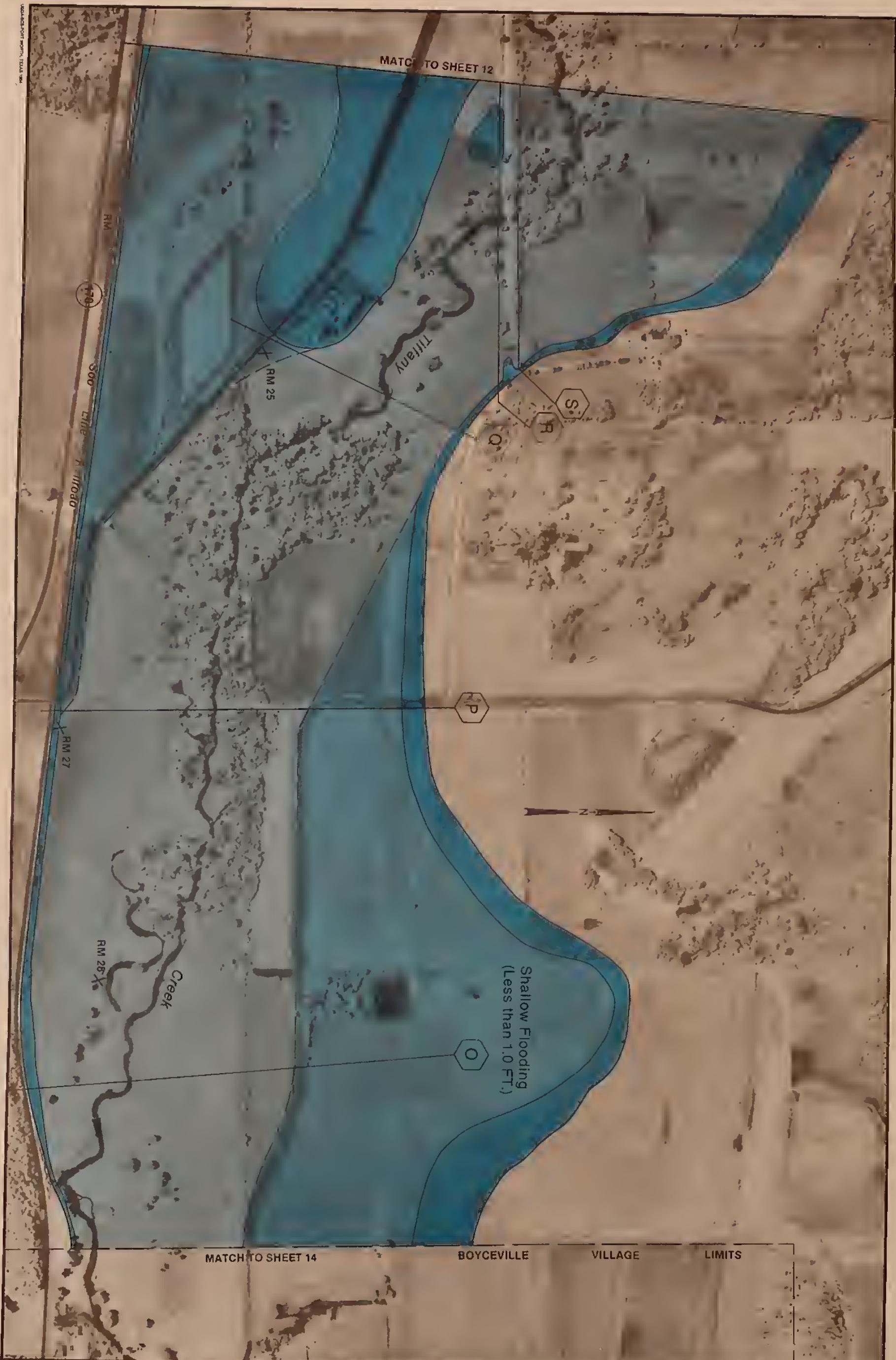
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FLOODWAY

FLOODPLAIN (WITH STRUCTURES)

FLOODPLAIN (WITHOUT STRUCTURES)

LEGEND

X RM 9

REFERENCE MARK

AX

CROSS SECTION LOCATION

STREAM FLOW

SCALE

0

400

800 FEET

0

100

200 METERS

APPROXIMATE

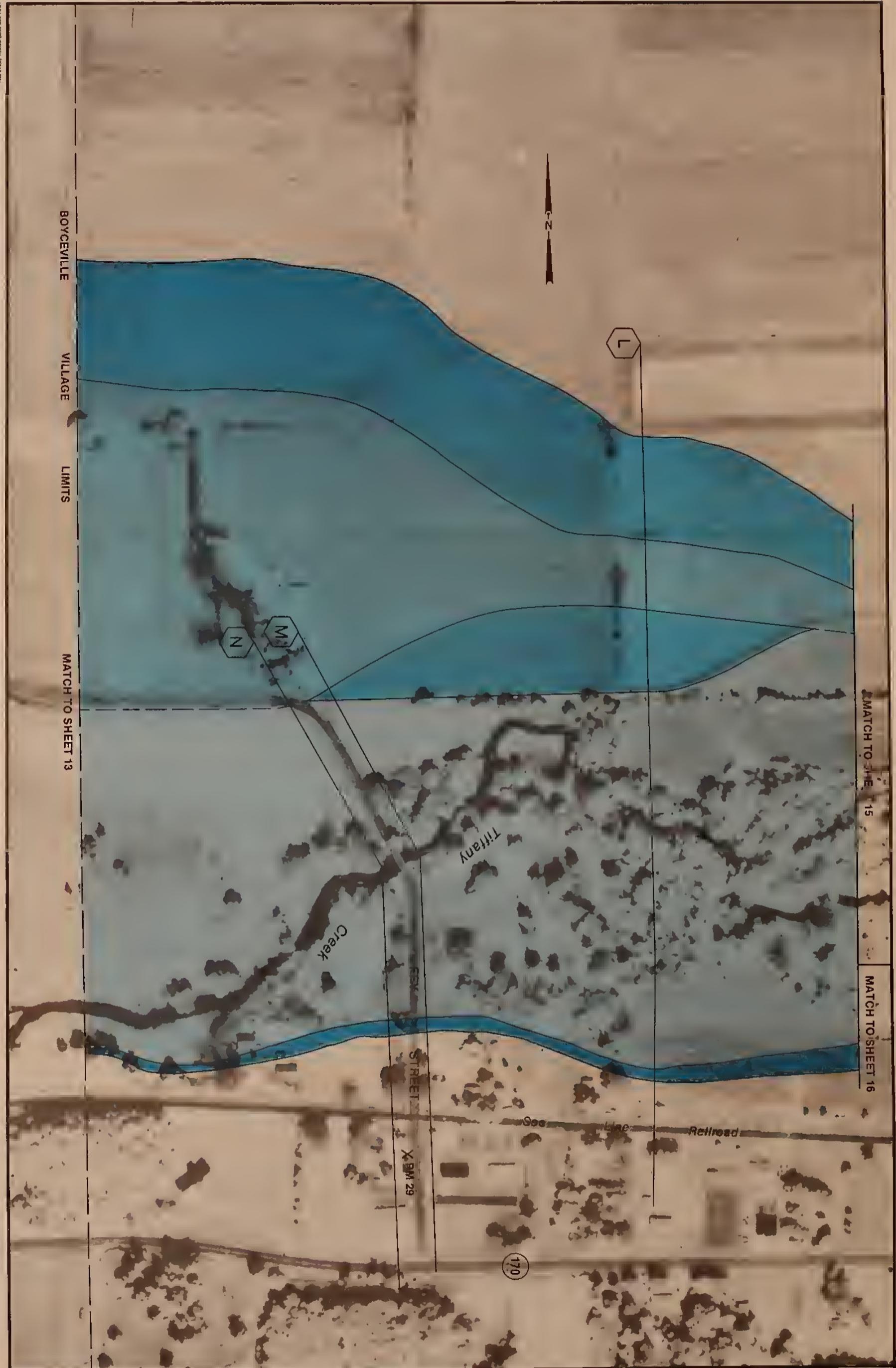
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FLOOD HAZARD AREA

TIFFANY CREEK





FLOODWAY
FLOODPLAIN (WITH STRUCTURES)
FLOODPLAIN (WITHOUT STRUCTURES)

LEGEND
X RM 9 REFERENCE MARK
AX CROSS SECTION LOCATION

STREAM FLOW
SCALE
0 200 400 FEET
0 50 100 METERS APPROXIMATE

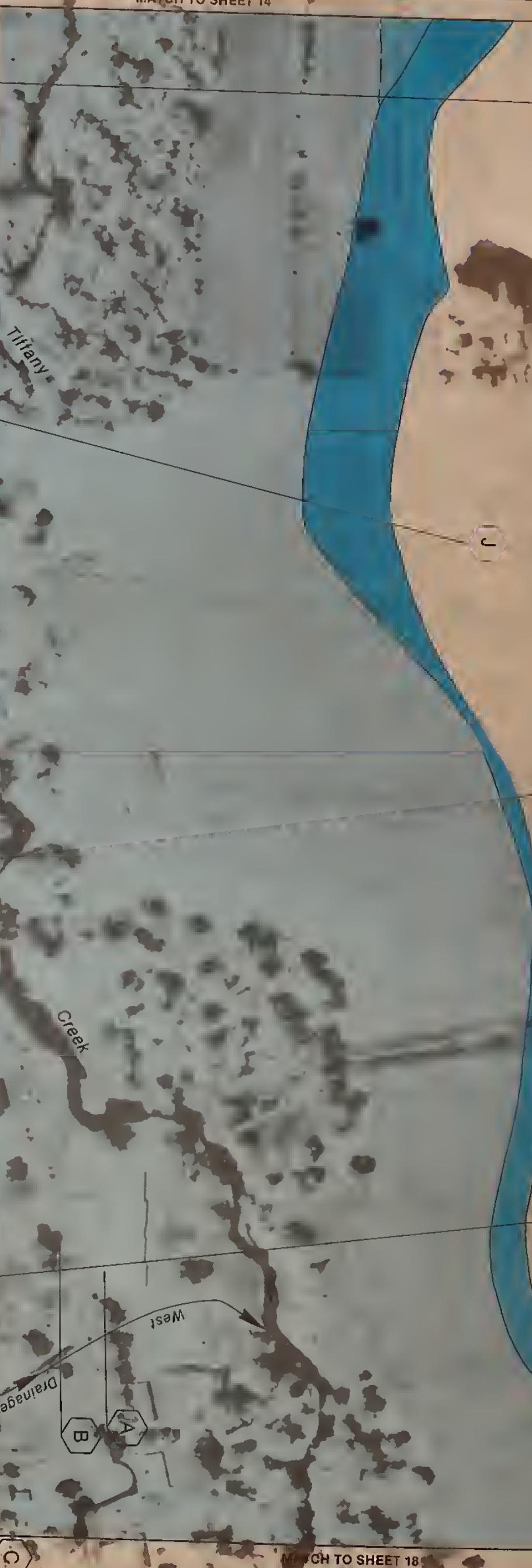
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FLOOD HAZARD AREA
VILLAGE OF BOYCEVILLE-TIFFANY CREEK



MATCH TO SHEET 14

MAPS BY U.S. GEOLOGICAL SURVEY
TRENTON, TEXAS 76563



MATCH TO SHEET 16

MATCH TO SHEET 18

FLOODWAY

FLOODPLAIN (WITH STRUCTURES)

FLOODPLAIN (WITHOUT STRUCTURES)

LEGEND

X RM 9 REFERENCE MARK

CROSS SECTION LOCATION

STREAM FLOW

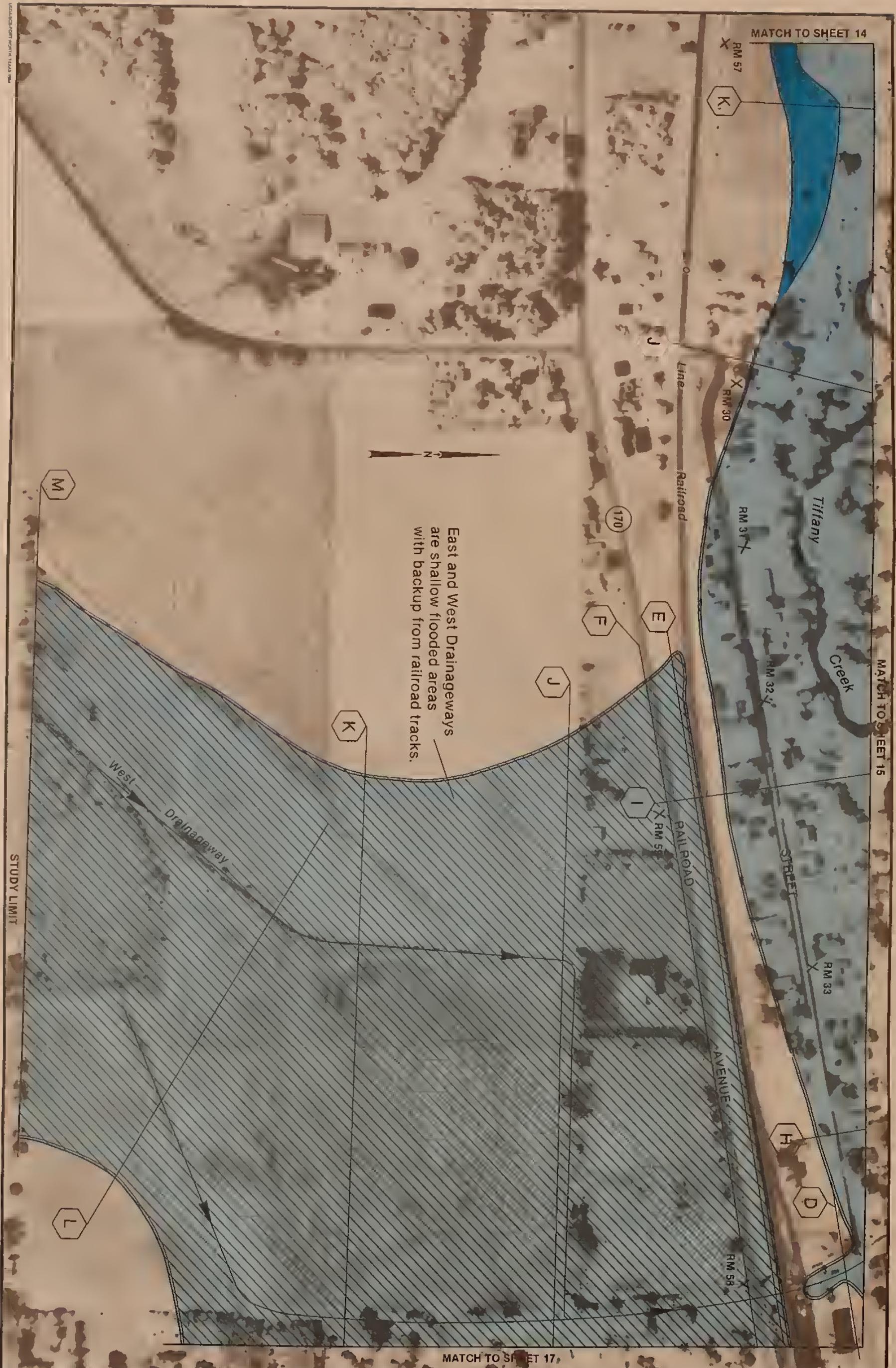
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FLOOD HAZARD AREA

VILLAGE OF BOYCEVILLE-TIFFANY CREEK









MATCH TO SHEET 18



FLOODWAY

FLOODPLAIN (WITH STRUCTURES)

FLOODPLAIN (WITHOUT STRUCTURES)

STREAM FLOW

0 200 400 FEET

0 50 100 METERS

APPROXIMATE

X RM 9

AX

REFERENCE MARK

CROSS SECTION LOCATION

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FLOOD HAZARD AREA

VILLAGE OF BOYCEVILLE-TIFFANY CREEK





FLOODWAY

FLOODPLAIN (WITH STRUCTURES)

FLOODPLAIN (WITHOUT STRUCTURES)

X RM 9

AX

LEGEND

REFERENCE MARK

CROSS SECTION LOCATION

STREAM FLOW

SCALE 0 200 400 FEET
0 50 100 METERS

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DUNN AND ST. CROIX COUNTIES, WISCONSIN

FLOOD HAZARD AREA

VILLAGE OF BOYCEVILLE-TIFFANY CREEK



MATCH TO SHEET 19

X RM 45

Tiffany

Creek

STUDY LIMIT

LIMITS

BOYCEVILLE
VILLAGE

AX

REFERENCE MARK
CROSS SECTION LOCATION

STREAM FLOW
SCALE 0 200 400 FEET
0 50 100 METERS

FLOODWAY

LEGEND

FLOODPLAIN (WITH STRUCTURES)

X RM 9

STREAM FLOW

FLOODPLAIN (WITHOUT STRUCTURES)

REFERENCE MARK

0 200 400 FEET

0 50 100 METERS

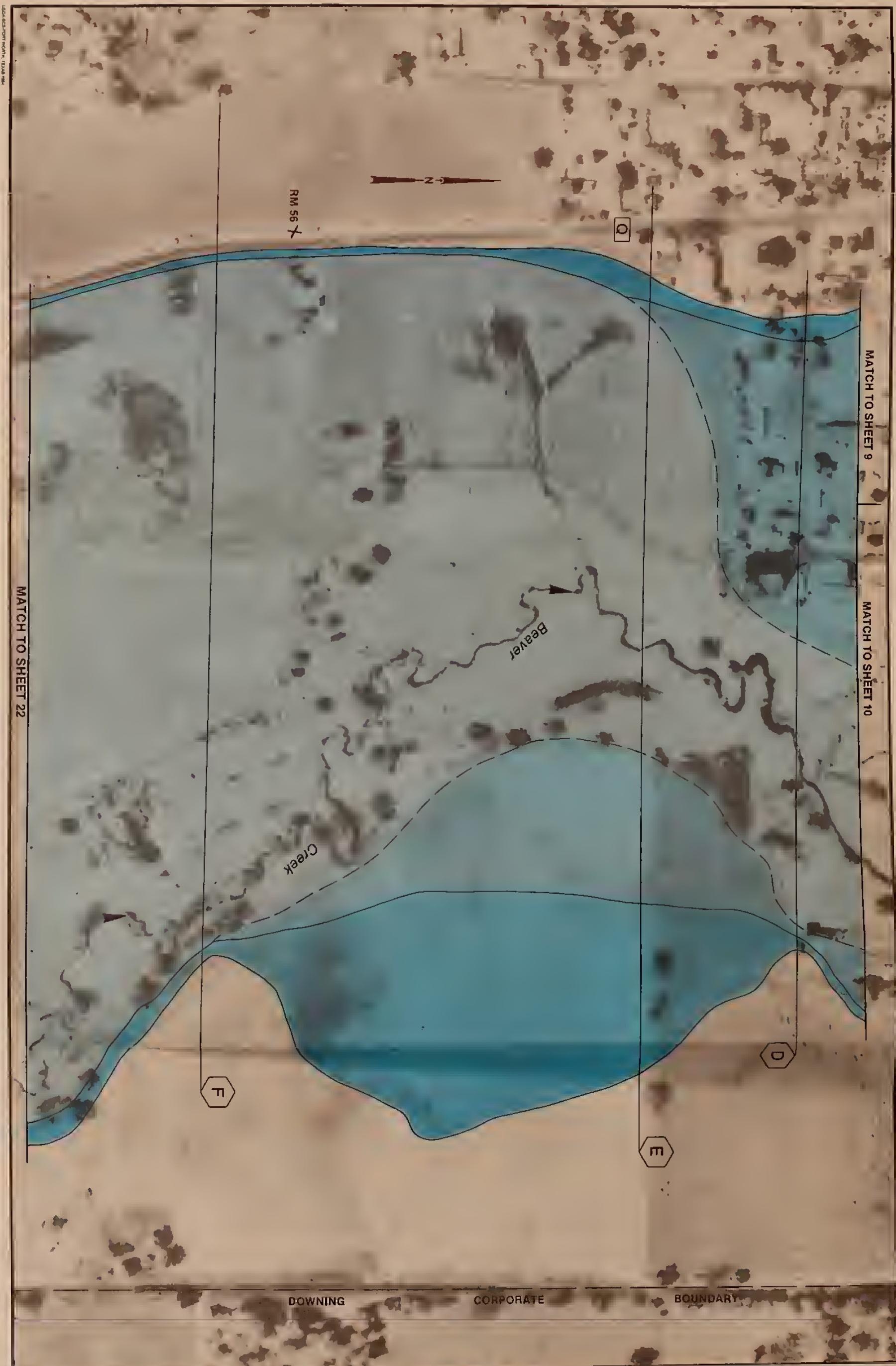
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FLOOD HAZARD AREA

VILLAGE OF BOYCEVILLE-TIFFANY CREEK





FLOODWAY
FLOODPLAIN (WITH STRUCTURES)
FLOODPLAIN (WITHOUT STRUCTURES)

X RM 9 REFERENCE MARK
AX CROSS SECTION LOCATION

STREAM FLOW
SCALE
0 200 400 FEET
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DUNN AND ST. CROIX COUNTIES, WISCONSIN

FLOOD HAZARD AREA
VILLAGE OF DOWNING - BEAVER CREEK



MATCH TO SHEET 21

DOWNING CORPORATE BOUNDARY

MATCH TO SHEET 23

W

A

G

H

Beaver

Creek

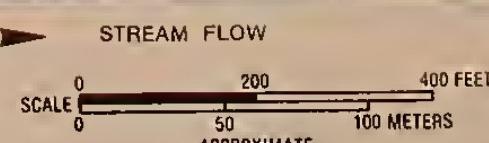
DOWNING

CORPORATE

BOUNDARY

- FLOODWAY
- FLOODPLAIN (WITH STRUCTURES)
- FLOODPLAIN (WITHOUT STRUCTURES)

- LEGEND
- X RM 9 REFERENCE MARK
 - AX CROSS SECTION LOCATION



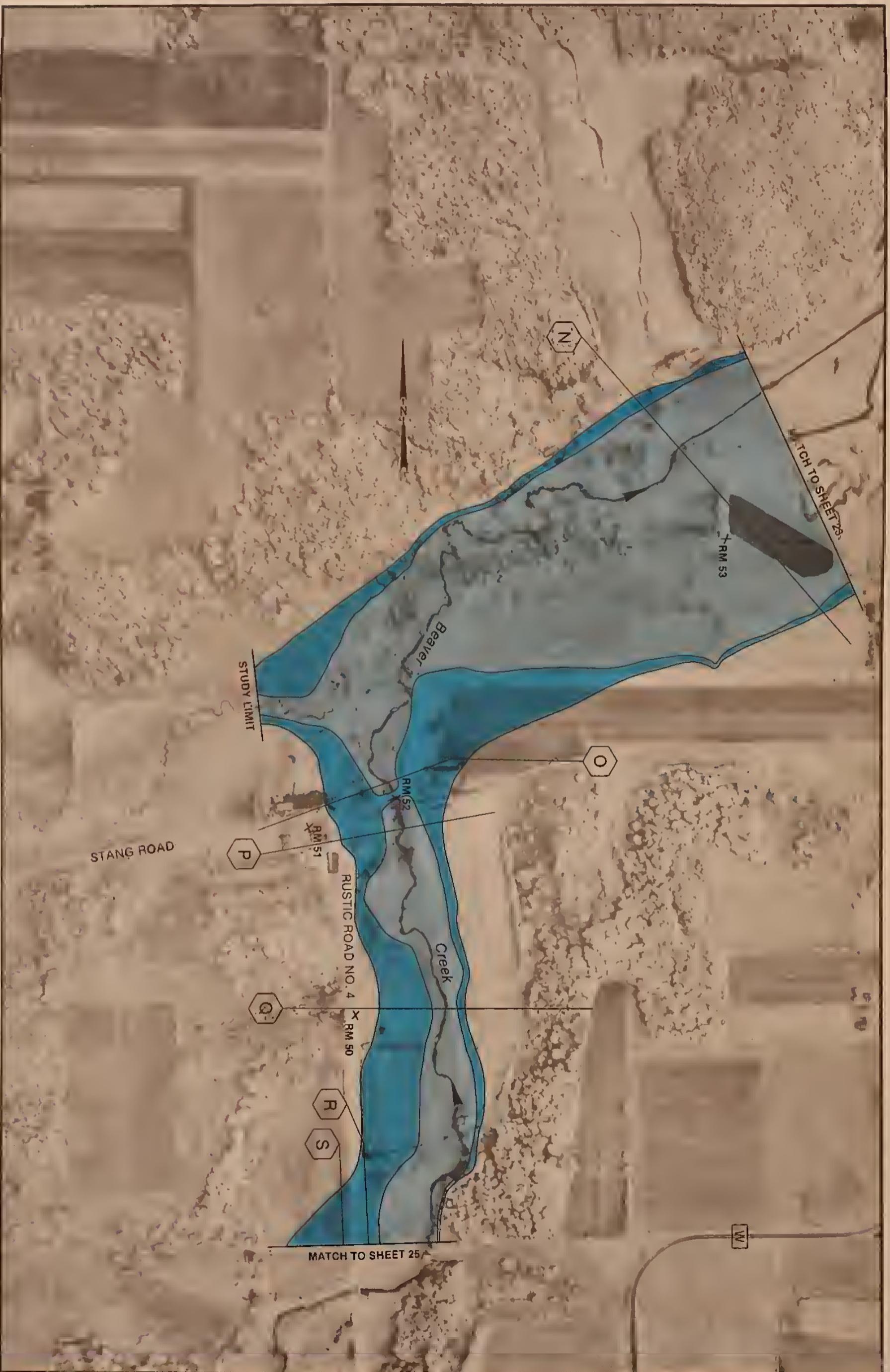
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FLOOD HAZARD AREA
VILLAGE OF DOWNING - BEAVER CREEK









FLOODWAY

FLOODPLAIN (WITH STRUCTURES)

FLOODPLAIN (WITHOUT STRUCTURES)

X RM 9

REFERENCE MARK

AX

CROSS SECTION LOCATION

STREAM FLOW

SCALE
0 400 800 FEET
0 100 200 METERS
APPROXIMATE

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DUNN AND ST. CROIX COUNTIES, WISCONSIN

FLOOD HAZARD AREA
BEAVER CREEK





FLOODWAY

FLOODPLAIN (WITH STRUCTURES)

FLOODPLAIN (WITHOUT STRUCTURES)

LEGEND

X RM 9

REFERENCE MARK

AX

CROSS SECTION LOCATION

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0 400 800 FEET
0 100 200 METERS
APPROXIMATE

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
FLOOD PLAIN MANAGEMENT STUDY
DUNN AND ST. CROIX COUNTIES, WISCONSIN

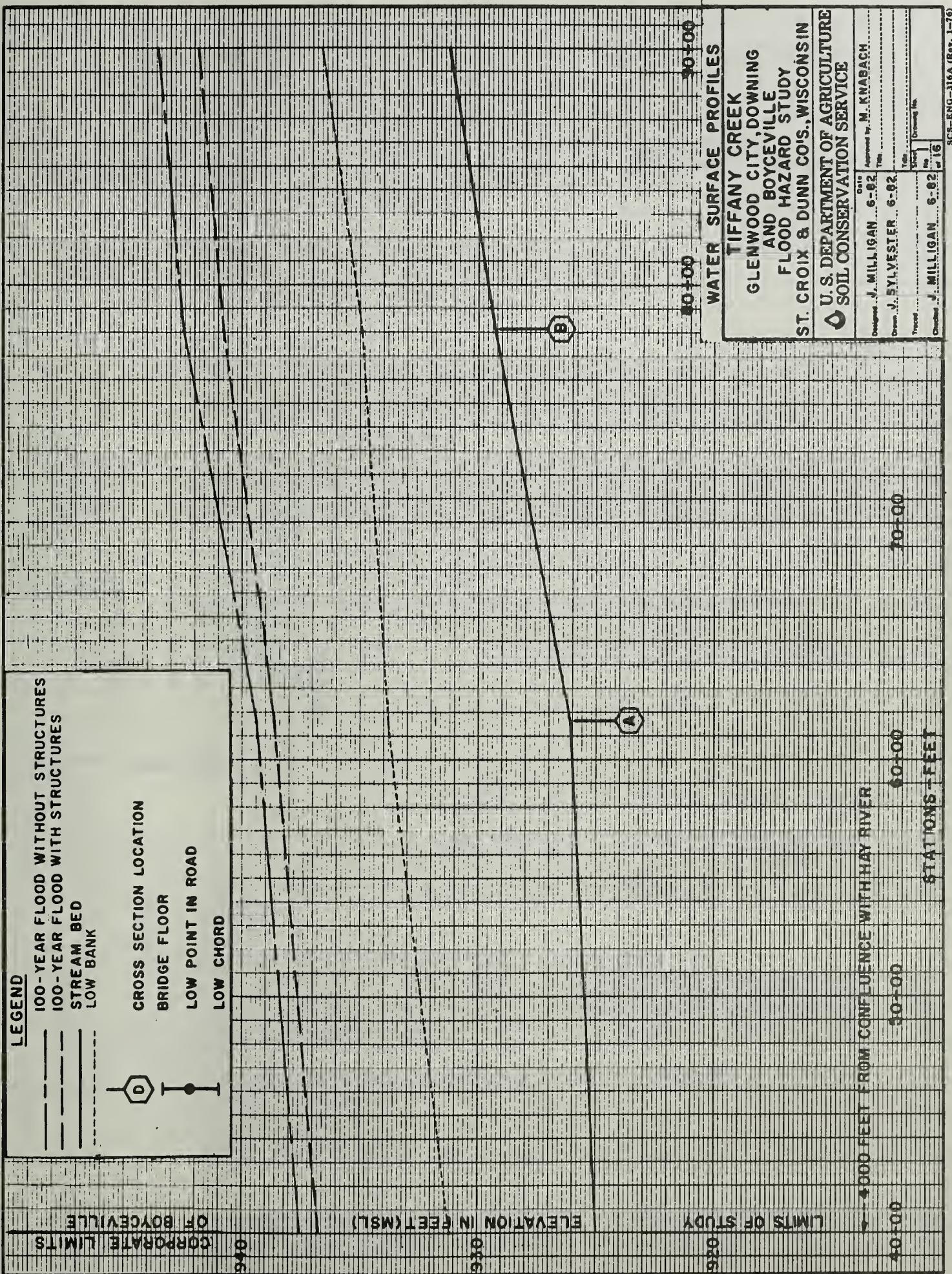
FLOOD HAZARD AREA

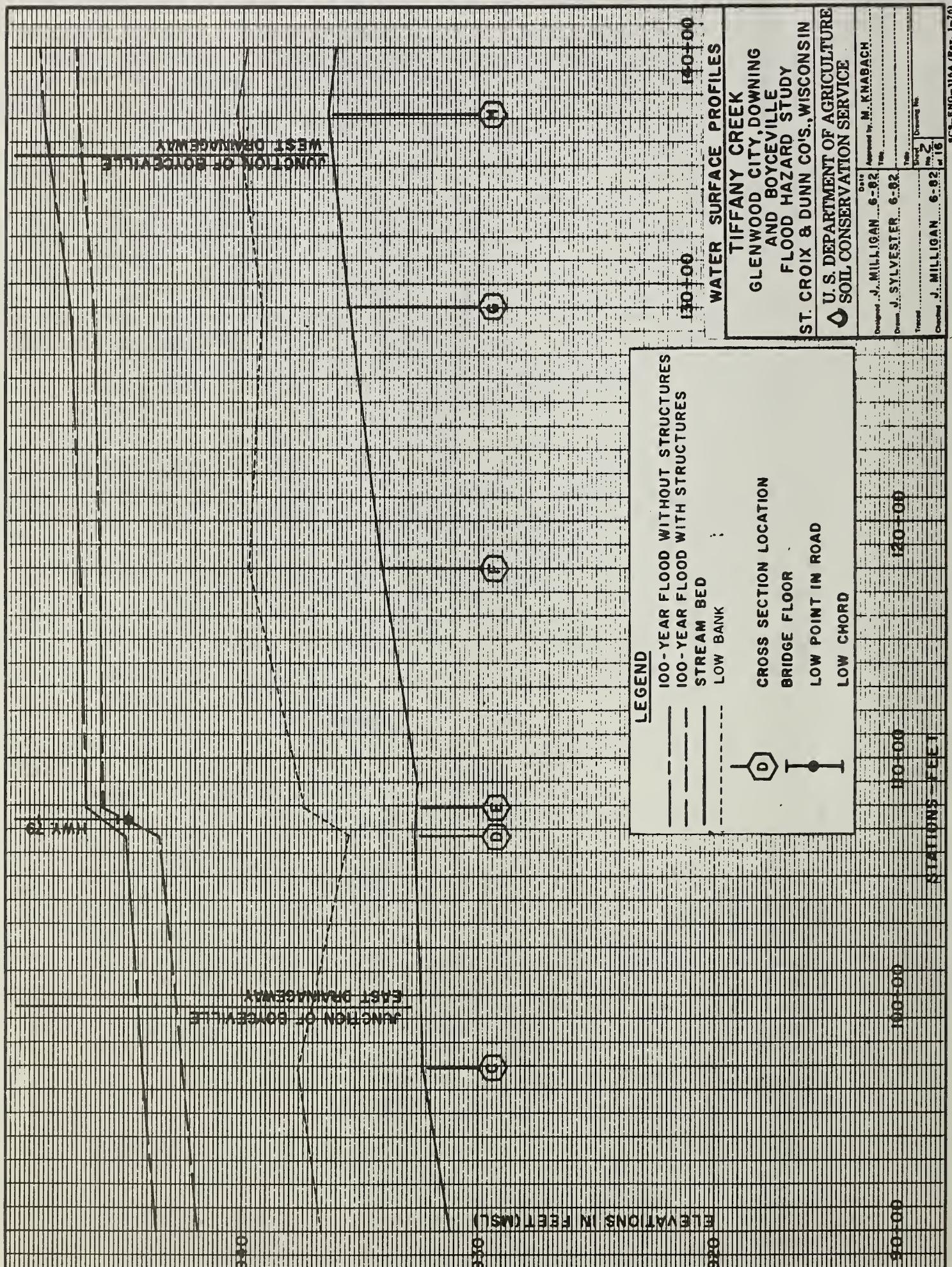
BEAVER CREEK



Appendix B

FLOOD PROFILES





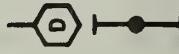
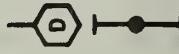
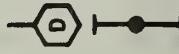
LEGEND

- — — CROSS SECTION LOCATION
- — — 100 - YEAR FLOOD WITHOUT STRUCTURES
- — — STREAM BED
- — — LOW BANK

BRIDGE FLOOR

LOW POINT IN ROAD

LOW CHORD



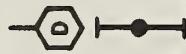
ELEVATIONS IN FEET (MSL)

B-3

WATER SURFACE PROFILES	
TIFFANY CREEK GLENWOOD CITY, DOWNING AND BOYCEVILLE FLOOD HAZARD STUDY	
ST. CROIX & DUNN CO'S., WISCONSIN	
U. S. DEPARTMENT OF AGRICULTURE	
○ SOIL CONSERVATION SERVICE	
Design.: J. MILLIGAN 6-82	Approved by M. KNABACH
Drawn: J. SYLVESTER 6-82	Rev.
Traced:	Survey No. 3
J. MILLIGAN 6-82	Drawing No. 16

LEGEND

- 100-YEAR FLOOD WITHOUT STRUCTURES**
- 100-YEAR FLOOD WITH STRUCTURES**
- STREAM BED**
- LOW BANK**

CROSS SECTION LOCATION**BRIDGE FLOOR****LOW POINT IN ROAD****LOW CHORD**

ELEVATIONS IN FEET MSL

B-4

CORPORATE LIMITS OF
BOYCEVILLE

960

ELEVATIONS IN FEET MSL

960

1000

2000-00

210-00

210-00

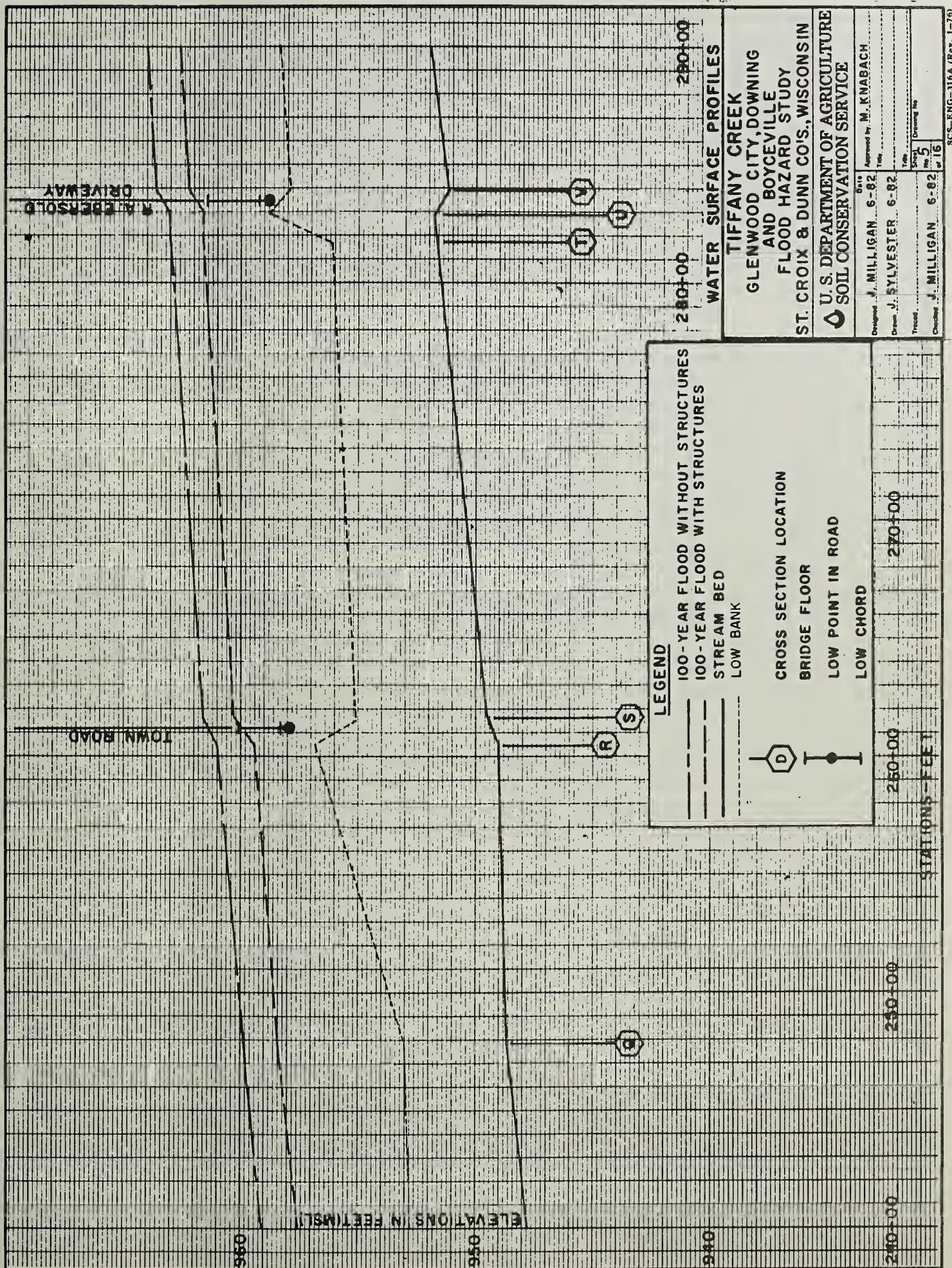
210-00

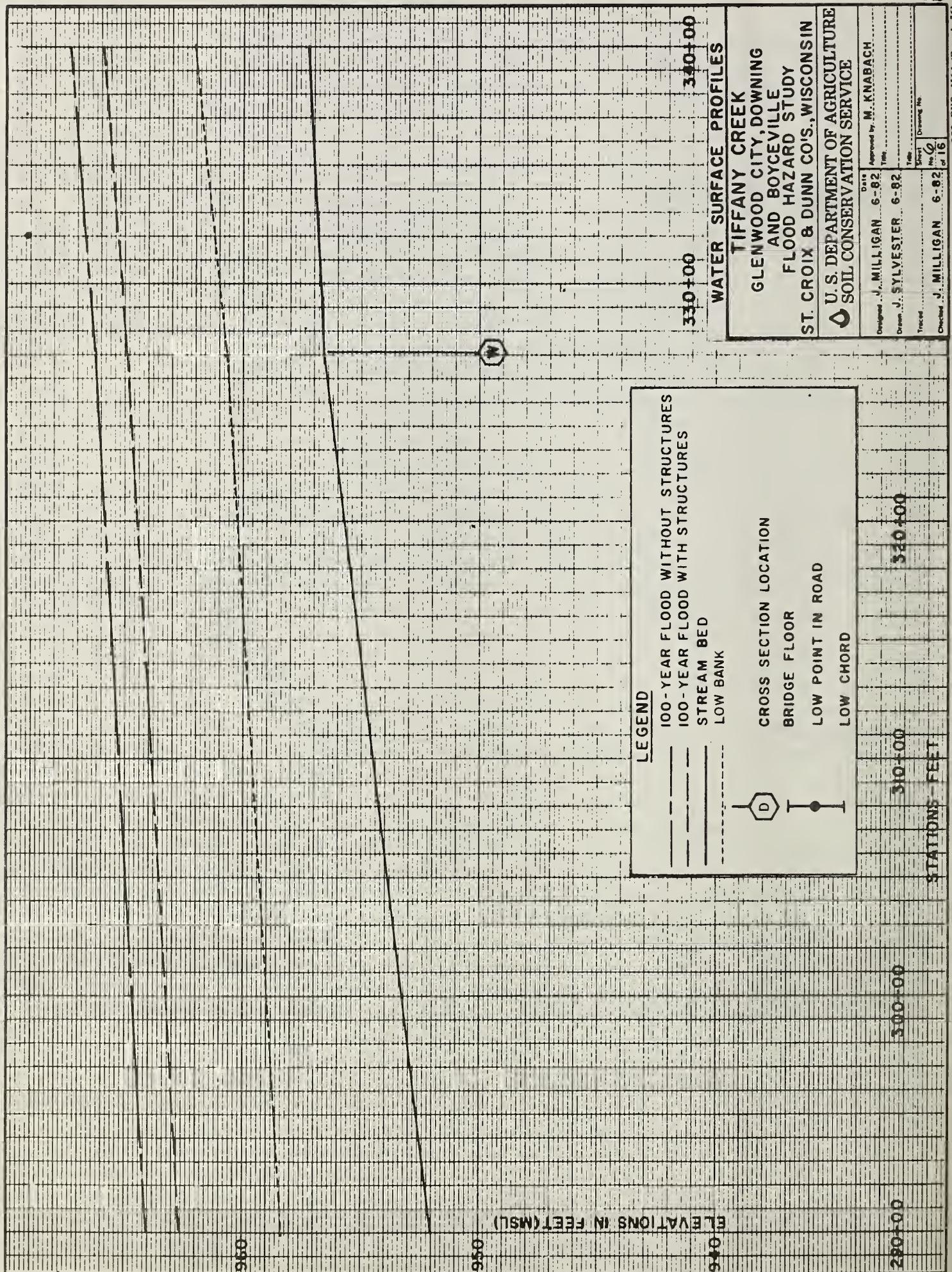
210-00

WATER SURFACE PROFILES
TIFFANY CREEK
GLENWOOD CITY, DOWNING
AND BOYCEVILLE
FLOOD HAZARD STUDY
ST. CROIX & DUNN COIS., WISCONSIN

U. S. DEPARTMENT OF AGRICULTURE
U. S. SOIL CONSERVATION SERVICE

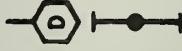
Design... J. MILLIGAN	6-82	Approved by M. KNABACH
Drawn... J. SYLVESTER	6-82	Date 6-82
Checked... J. MILLIGAN	6-82	Scale 1:64000
		16





LEGEND

100 - YEAR FLOOD WITHOUT STRUCTURES
100 - YEAR FLOOD WITH STRUCTURES
STREAM BED
LOW BANK

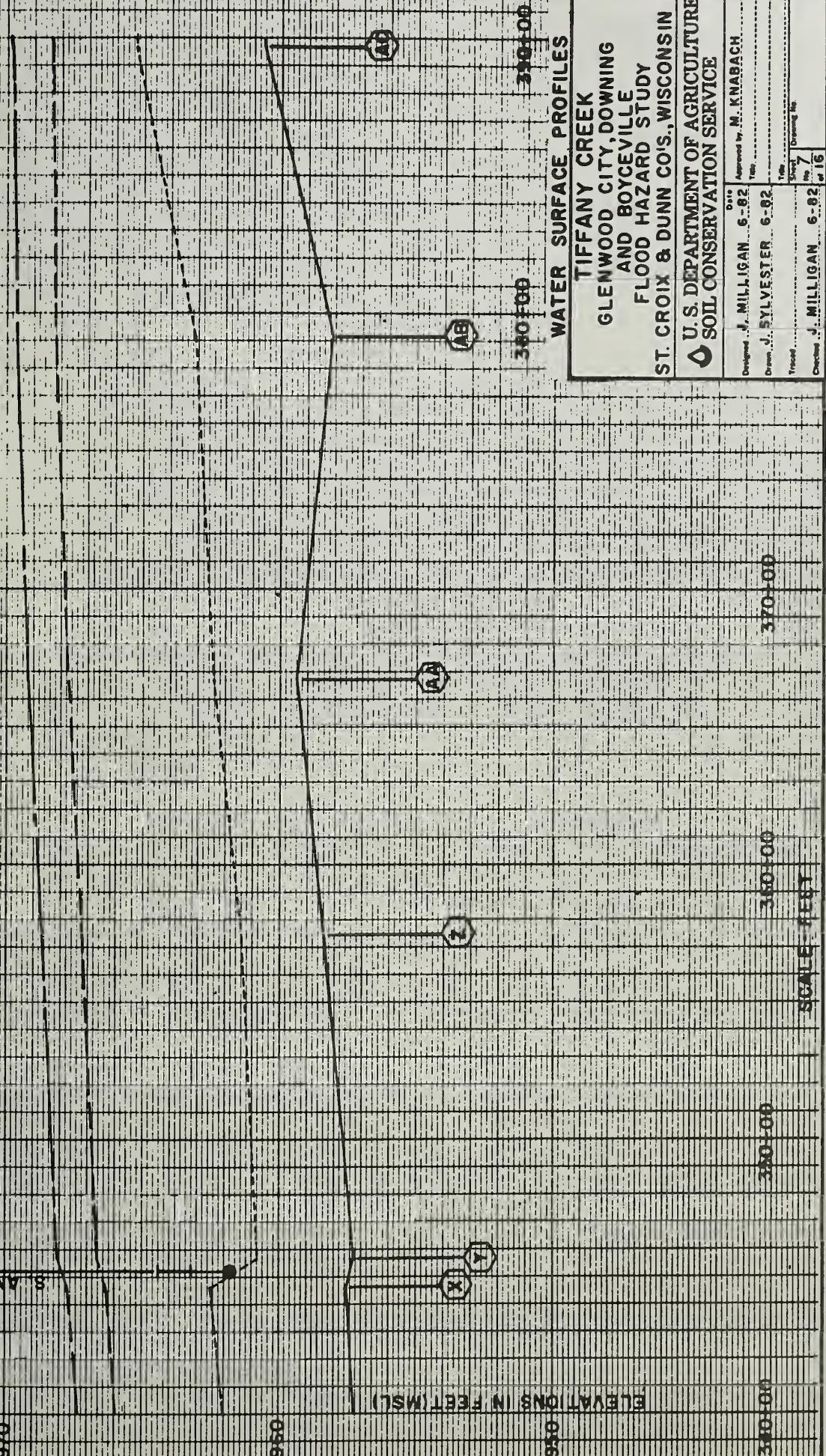


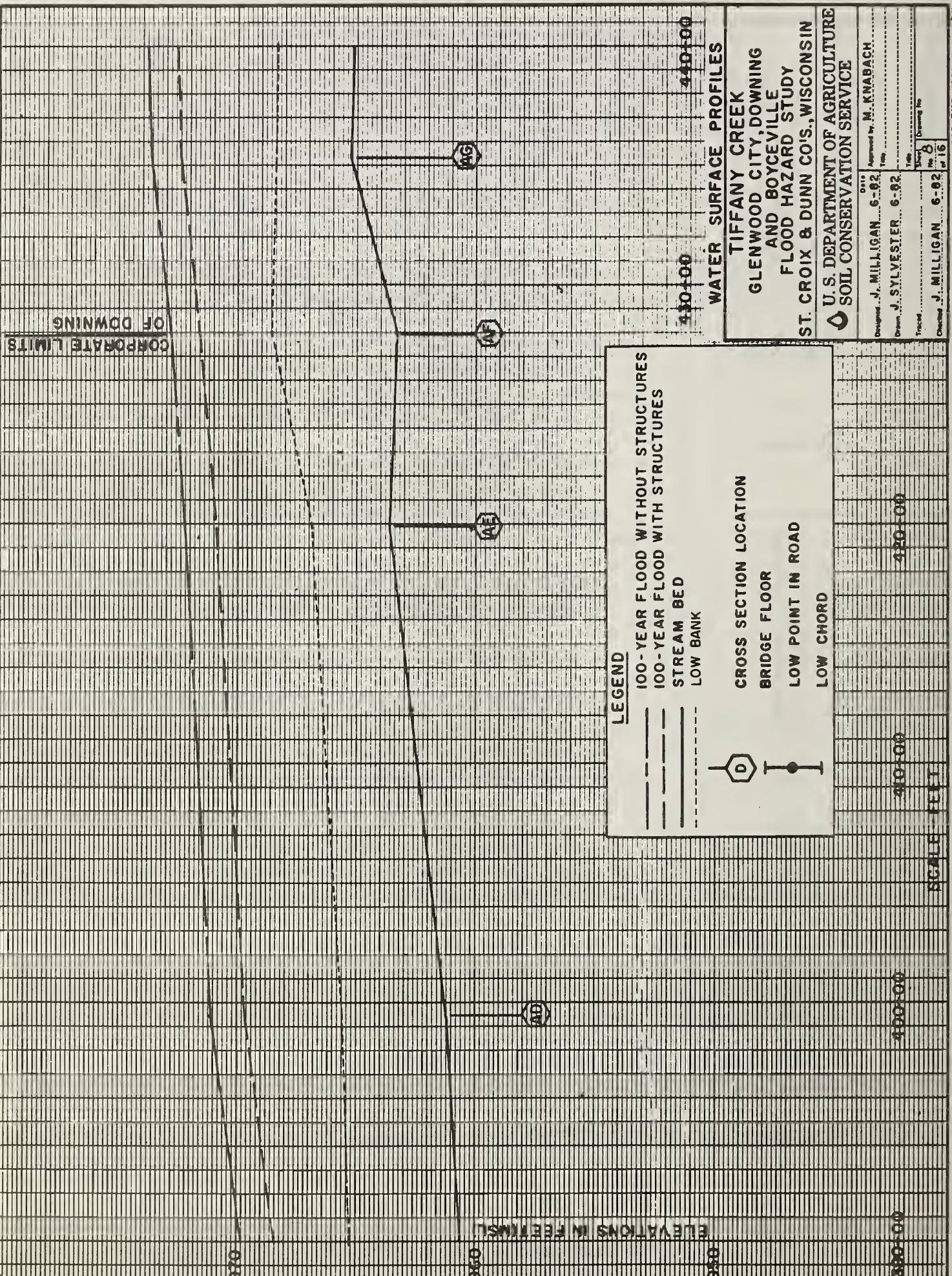
CROSS SECTION LOCATION

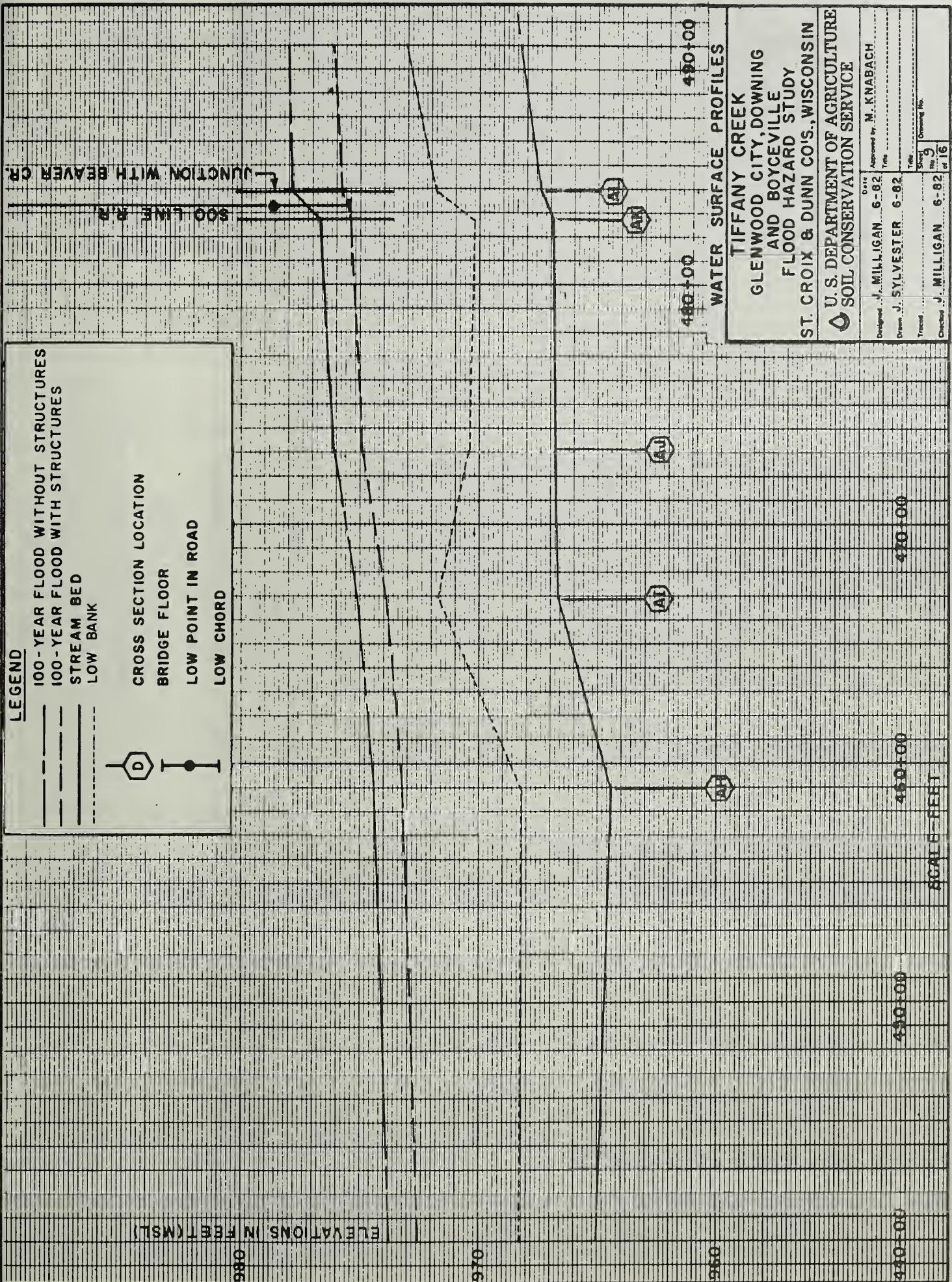
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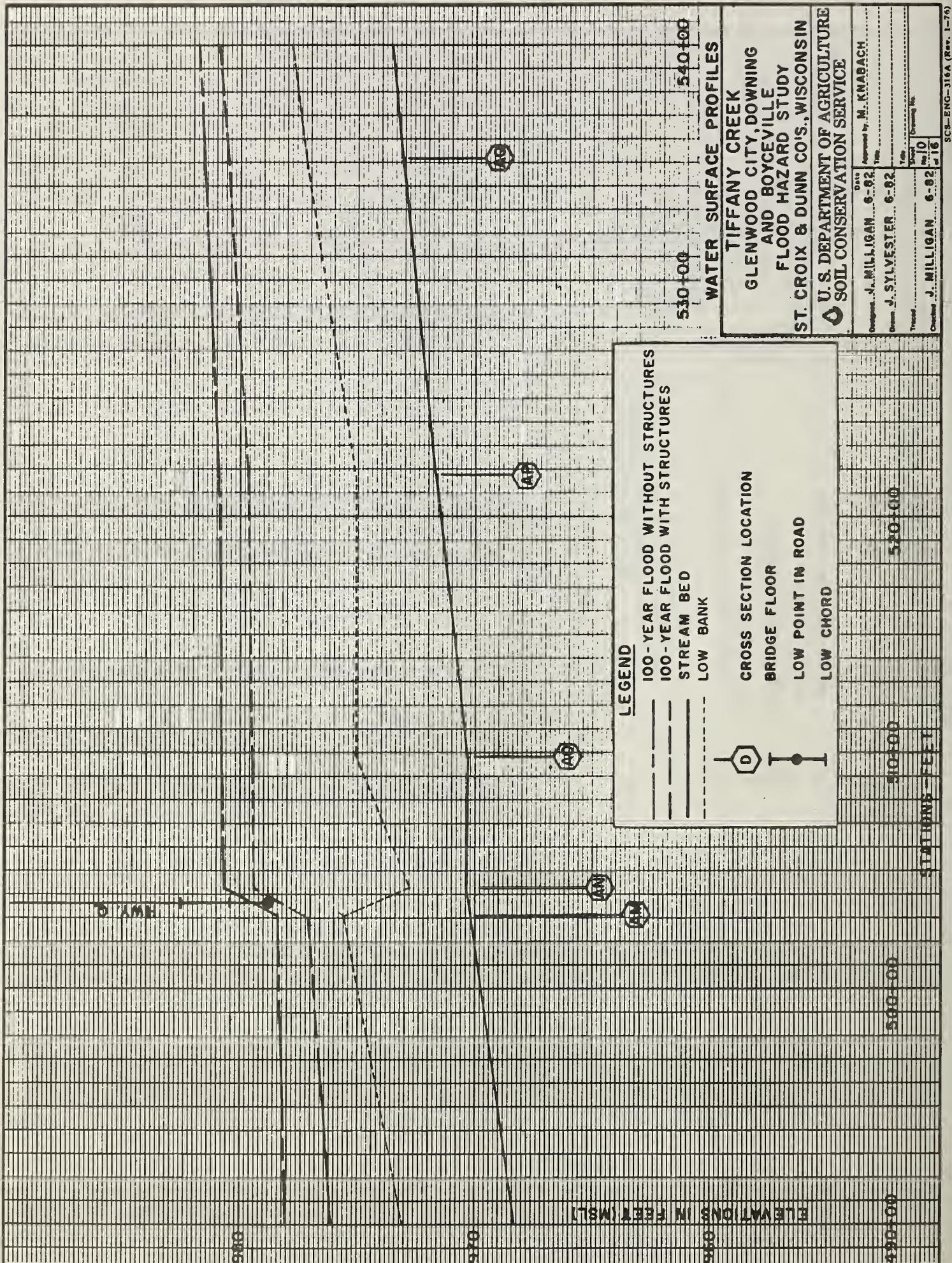
LOW BOATING IN ROAD

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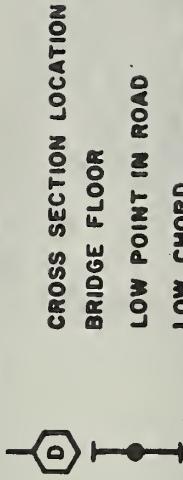




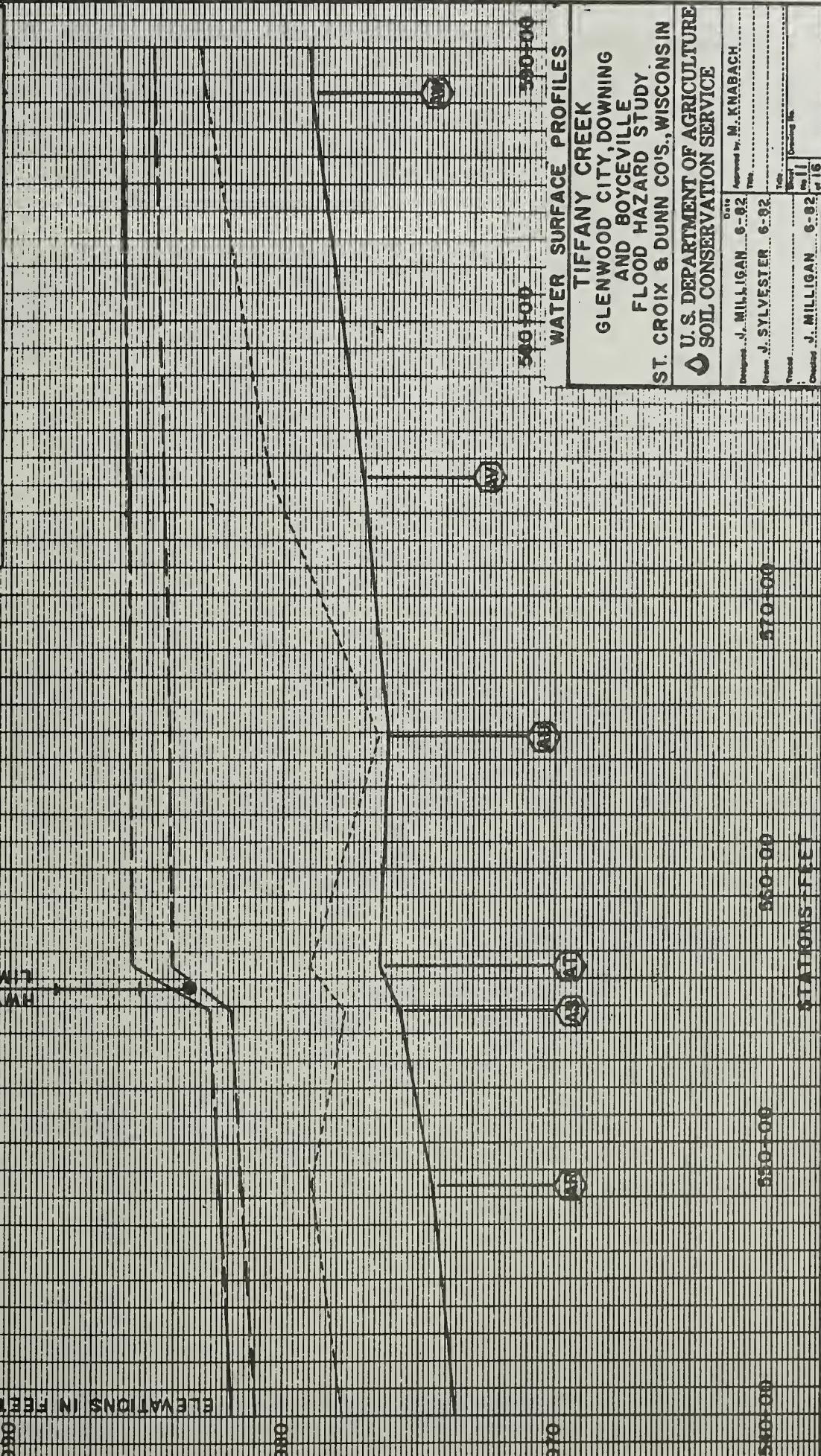


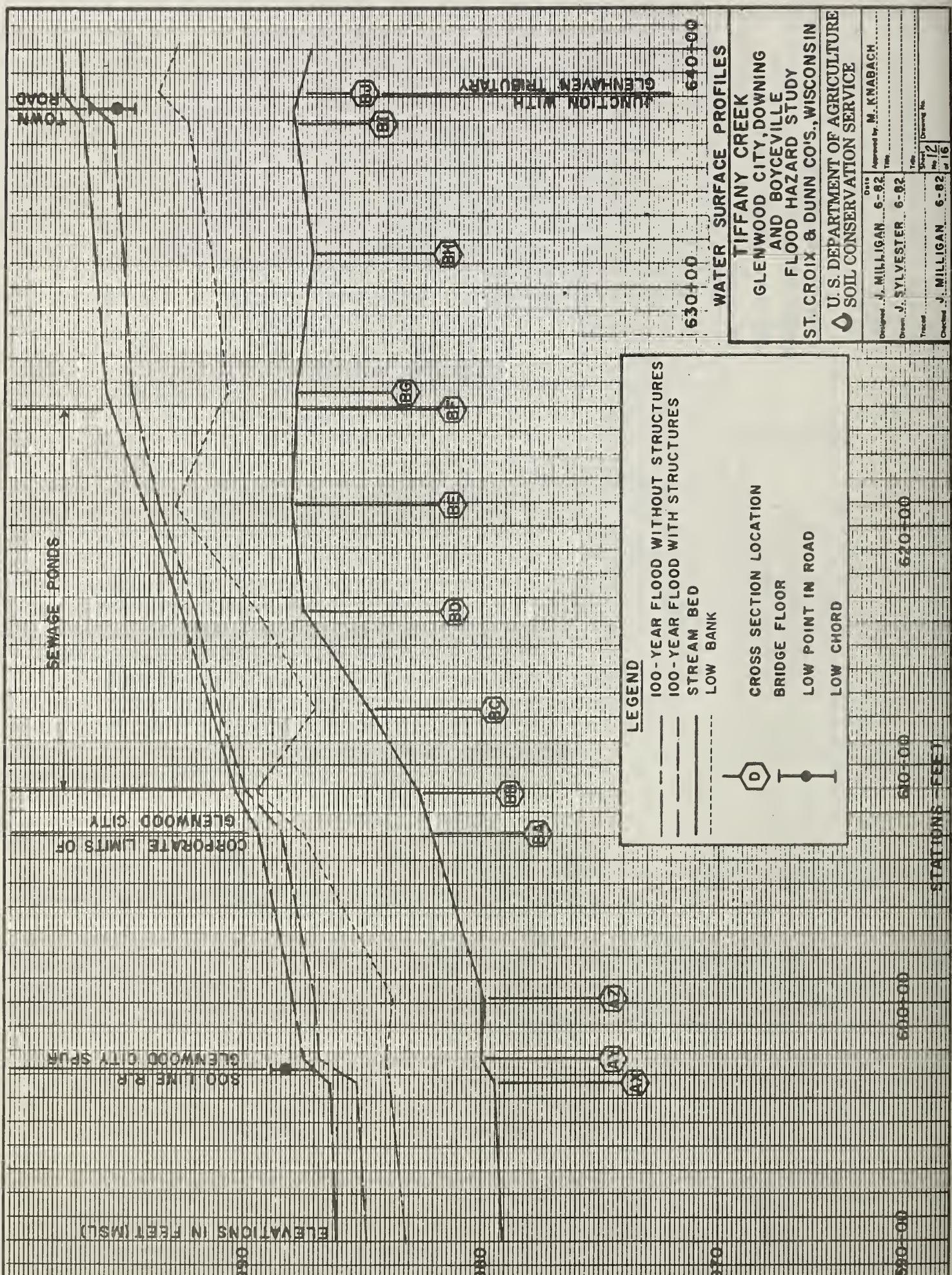
LEGEND

100-YEAR FLOOD WITHOUT STRUCTURES
100-YEAR FLOOD WITH STRUCTURES
STREAM BED
LOW BANK



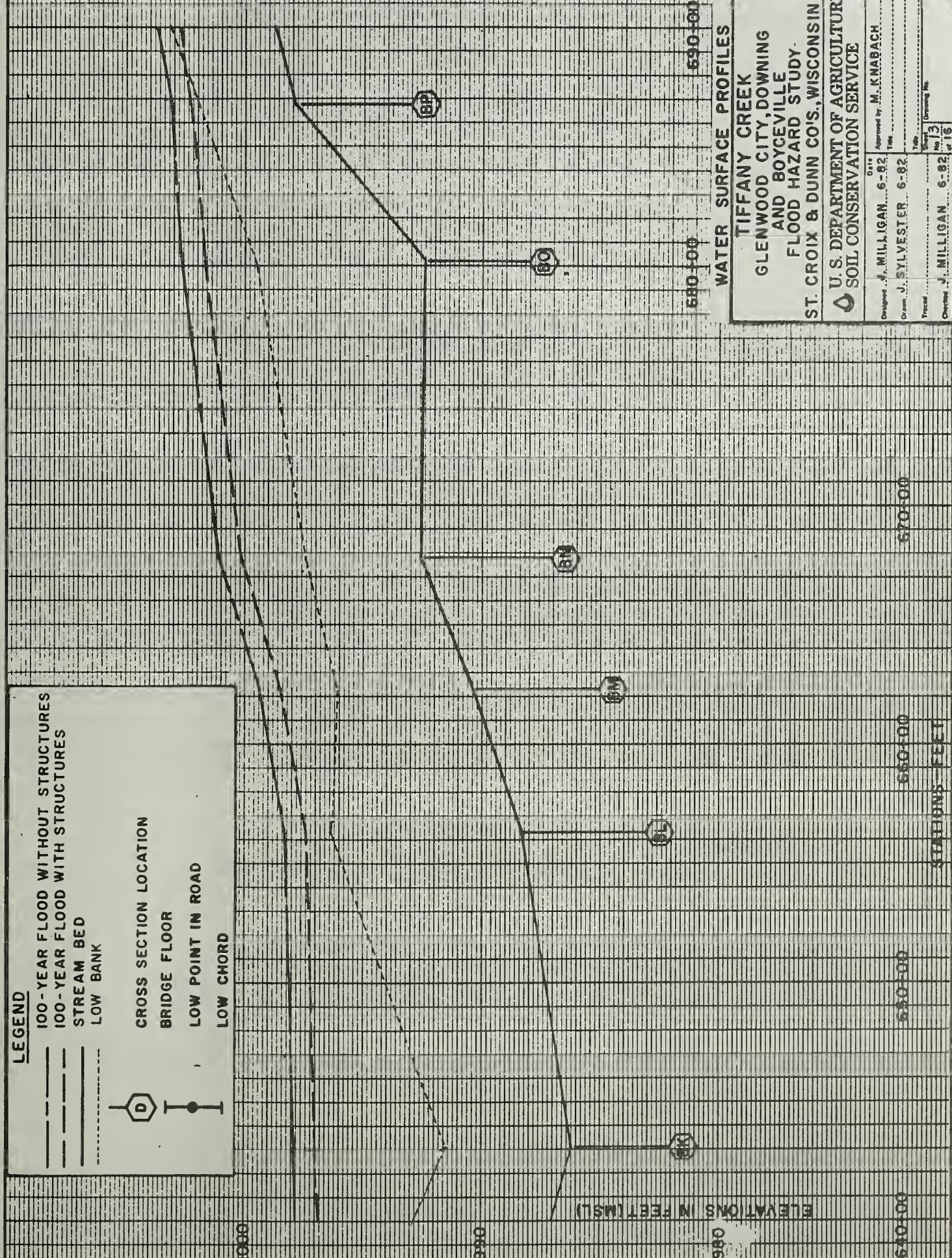
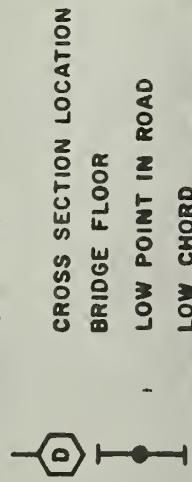
ENVIRONMENTAL CORPORATE COMMUNICATIONS

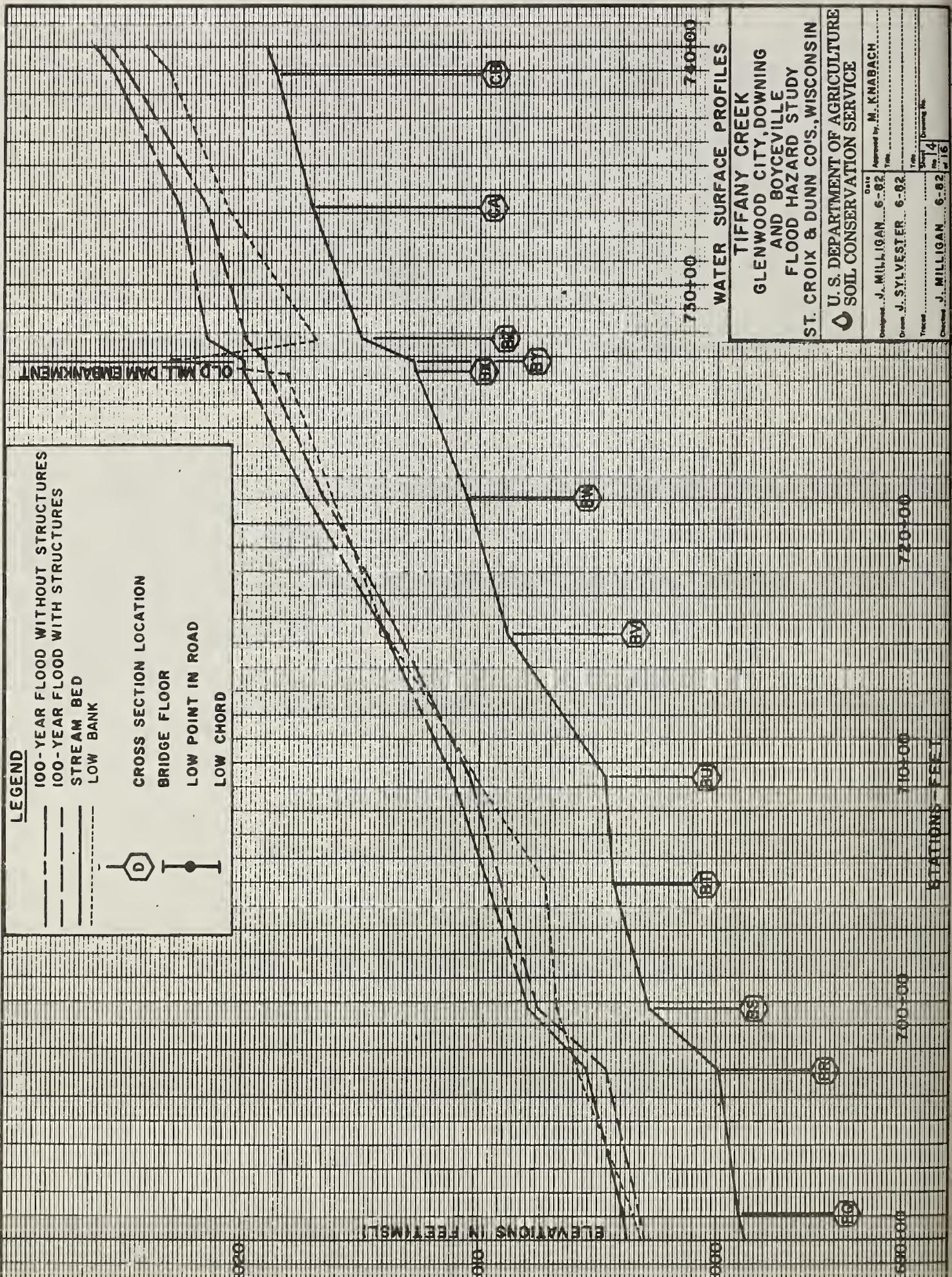




LEGEND

- 100-YEAR FLOOD WITHOUT STRUCTURES**
- 100-YEAR FLOOD WITH STRUCTURES**
- STREAM BED**
- LOW BANK**





LEGEND

100-YEAR FLOOD WITHOUT STRUCTURES
100-YEAR FLOOD WITH STRUCTURES
STREAM BED
LOW BANK

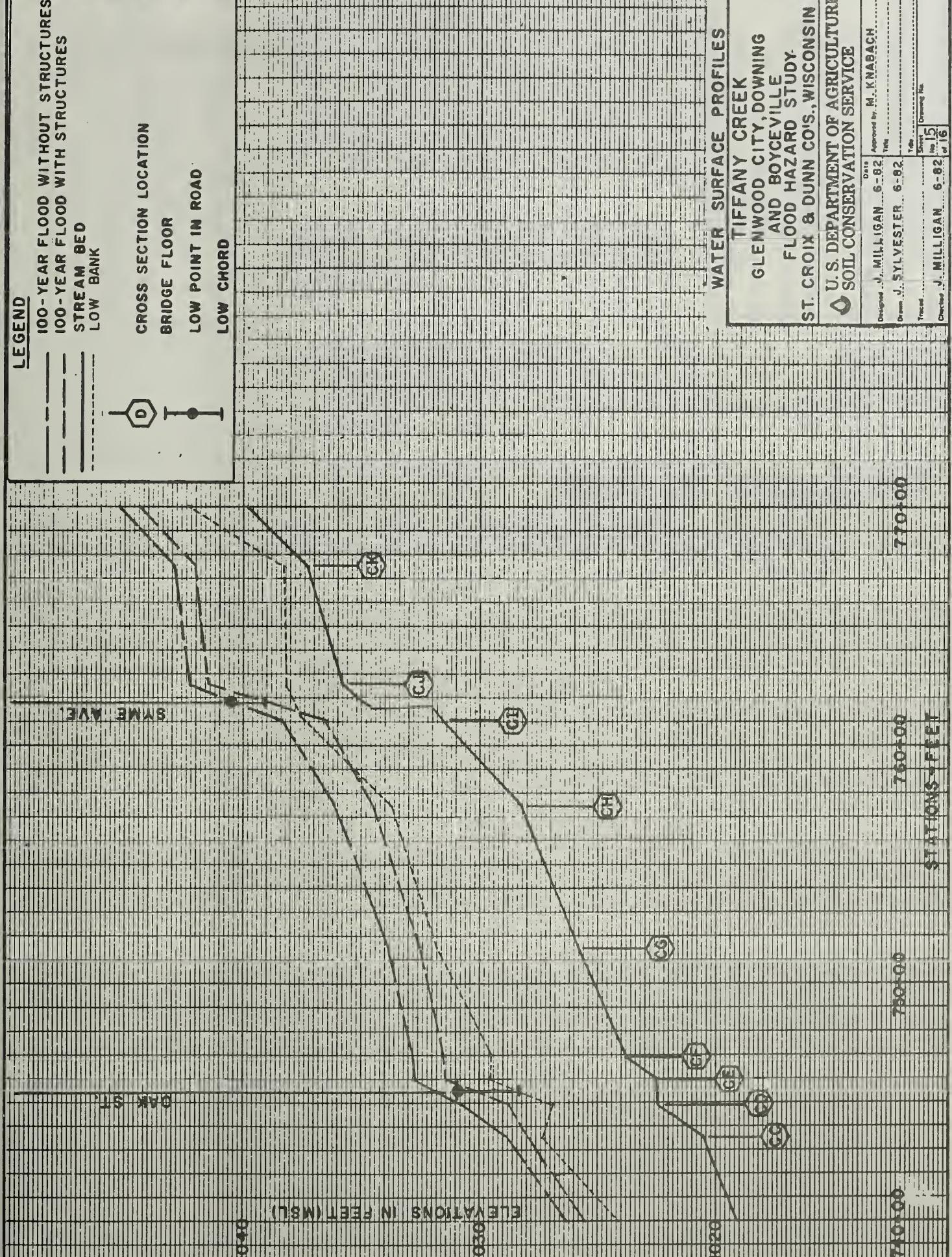


CROSS SECTION LOCATION

BRIDGE FLOOR

LOW POINT IN BOARD

LOW CHORD



WATER SURFACE PROFILES

**TIFFANY CREEK
GLENWOOD CITY, DOWNING
AND BOYCEVILLE
FLOOD HAZARD STUDY.
ST. CROIX & DUNN CO'S., WISCONSIN**

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

M. KNABACH

APRIL 19, 1942

J. SYLVESTER 6-82

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J. MICHIGAN 6-82 no 15

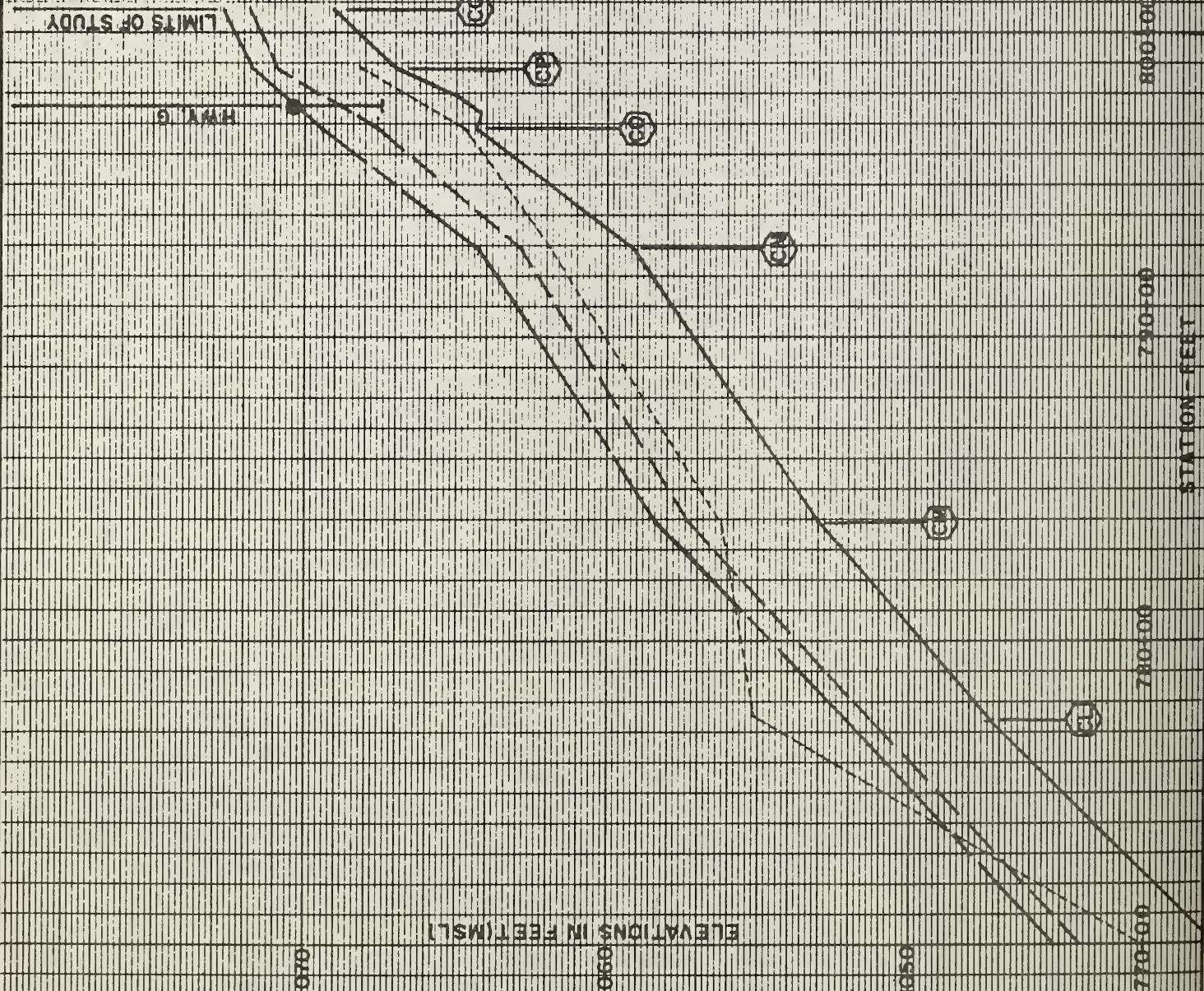
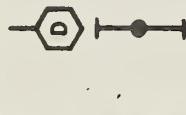
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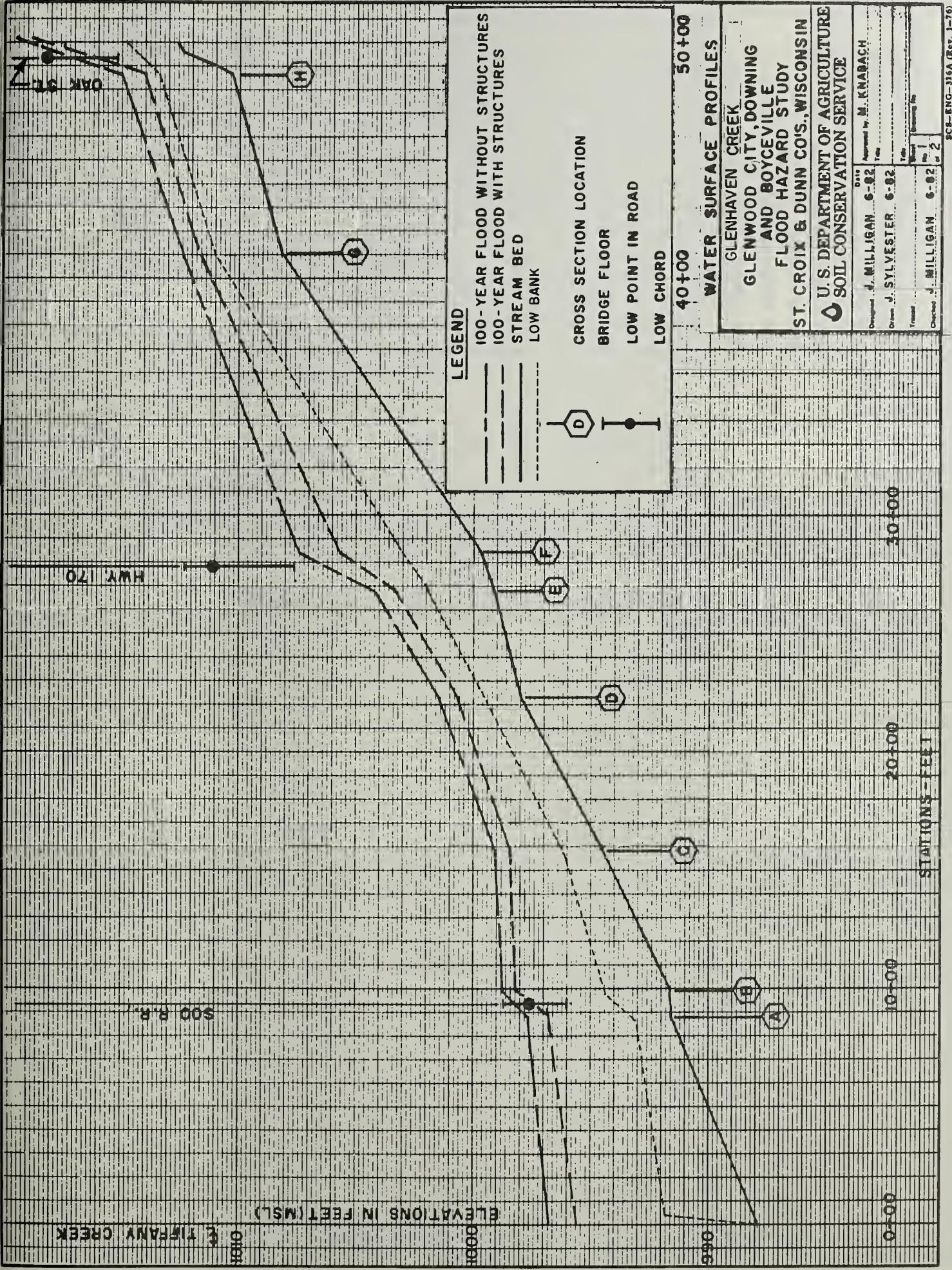
LEGEND

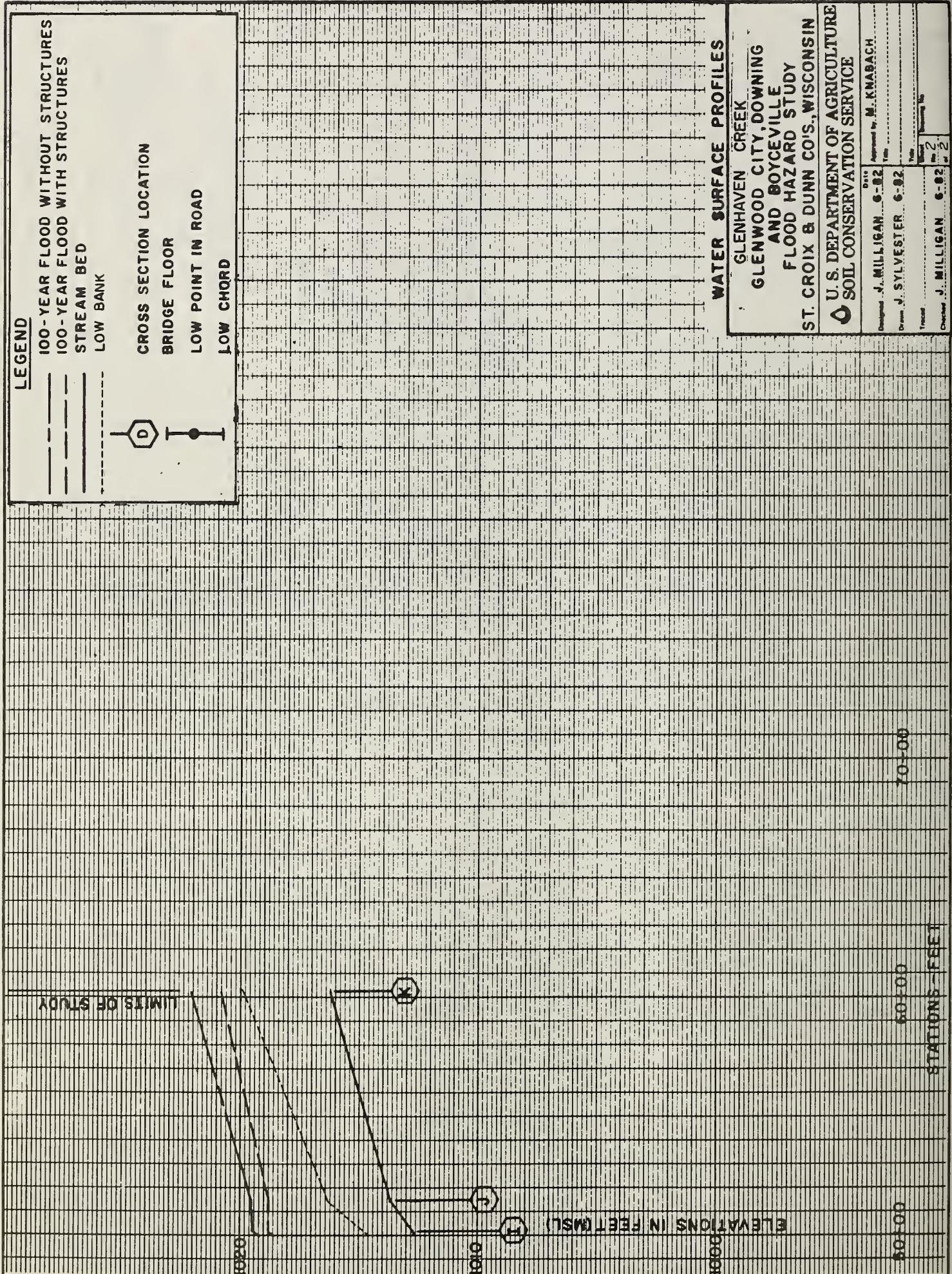
- 100-YEAR FLOOD WITHOUT STRUCTURES
- 100-YEAR FLOOD WITH STRUCTURES
- STREAM BED
- LOW BANK

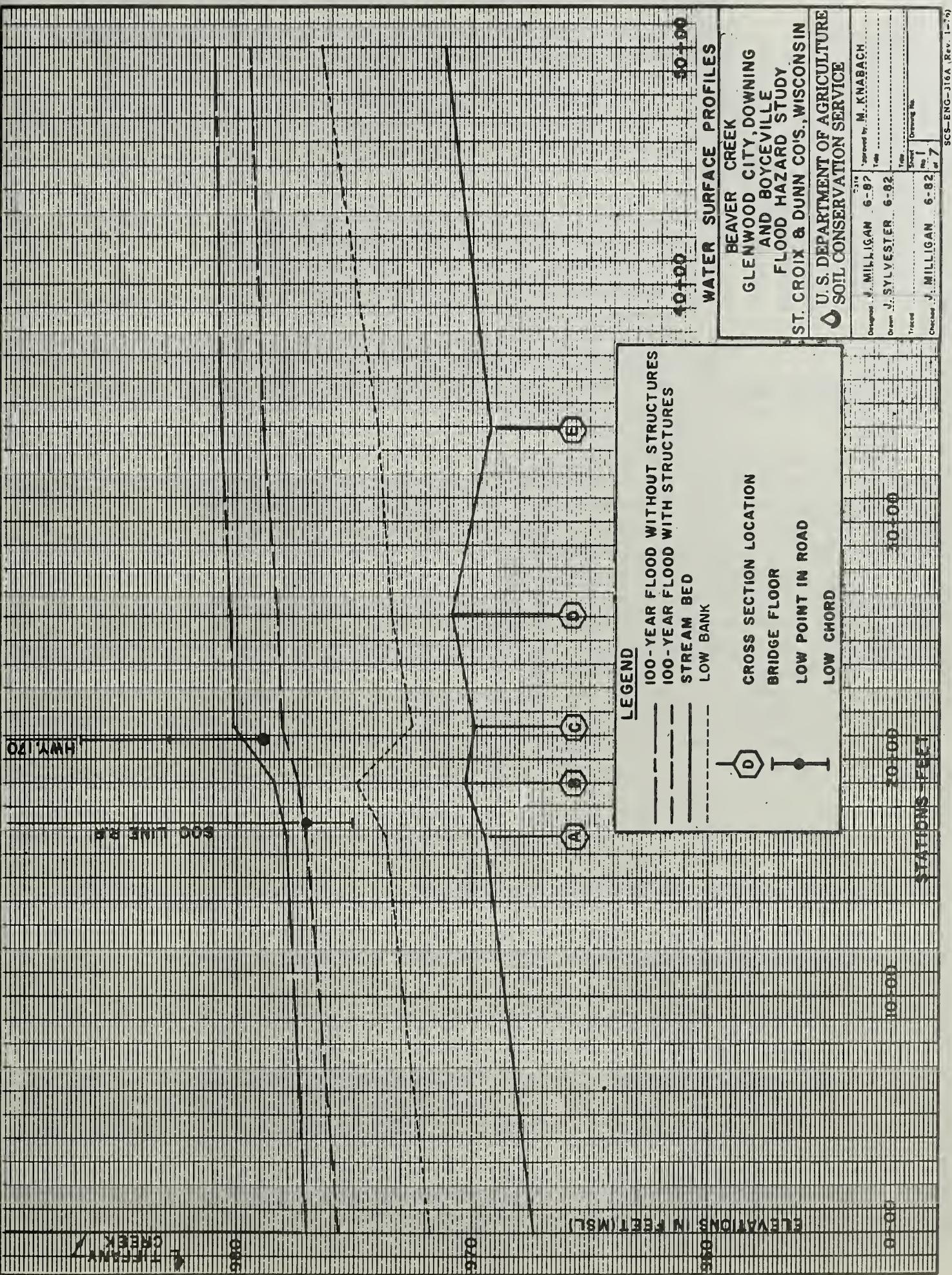
CROSS SECTION LOCATION

- BRIDGE FLOOR**
- LOW POINT IN ROAD**
- LOW CHORD**





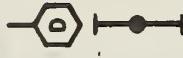




LEGEND

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- — — — 100-YEAR FLOOD WITH STRUCTURES
- — — STREAM BED
- — — LOW BANK

CROSS SECTION LOCATION
BRIDGE FLOOR
LOW POINT IN ROAD
LOW CHORD



ELEVATIONS (IN FEET (MSL))

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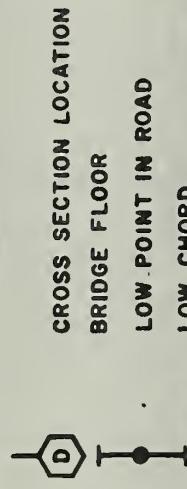
100

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LEGEND

- 100-YEAR FLOOD WITHOUT STRUCTURES
- 100-YEAR FLOOD WITH STRUCTURES
- STREAM BED
- LOW BANK



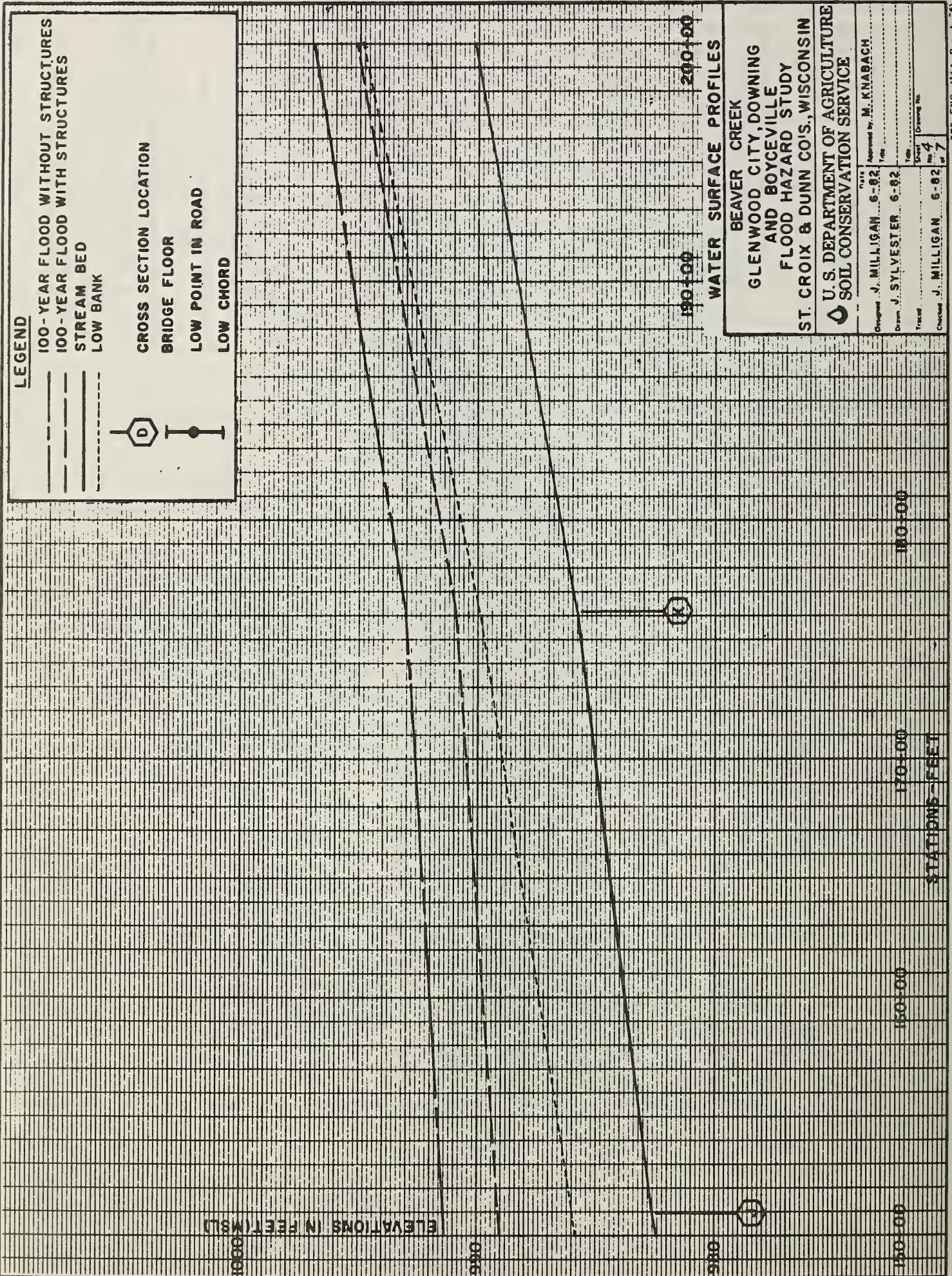
ELLEVATIONS IN FEET (MSL)

980 990 1000 1010 1020 1030 1040 1050 1060 1070 1080 1090 1100 1110 1120 1130 1140 1150 1160 1170 1180 1190 1200 1210 1220 1230 1240 1250 1260 1270 1280 1290 1300 1310 1320 1330 1340 1350 1360 1370 1380 1390 1400 1410 1420 1430 1440 1450 1460 1470 1480 1490 1500 1510 1520 1530 1540 1550 1560 1570 1580 1590 1600 1610 1620 1630 1640 1650 1660 1670 1680 1690 1700 1710 1720 1730 1740 1750 1760 1770 1780 1790 1800 1810 1820 1830 1840 1850 1860 1870 1880 1890 1900 1910 1920 1930 1940 1950 1960 1970 1980 1990 2000

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WATER SURFACE PROFILES	
BEAVER CREEK GLENWOOD CITY, DOWNING AND BOYCEVILLE FLOOD HAZARD STUDY ST. CROIX & DUNN CO'S., WISCONSIN	
U. S. DEPARTMENT OF AGRICULTURE ◊ SOIL CONSERVATION SERVICE	
D-11 M. KNABACH Approved by: M. KNABACH	
Designer J. MILLIGAN 6-92 Drawn J. SYLVESTER 6-92	
Title No. 3 Sheet No. 7	
Traced Checked J. MILLIGAN 6-92	
Drawing No. 7	
SCS-ENG-J16A, Rev. 1-76	



LEGEND

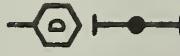
- — — 100-YEAR FLOOD WITHOUT STRUCTURES
- — — 100-YEAR FLOOD WITH STRUCTURES
- — — STREAM BED
- — — LOW BANK

CROSS SECTION LOCATION

BRIDGE FLOOR

LOW POINT IN ROAD

LOW CHORD



ELEVATIONS IN FEET (MSL)

1880

1890

1900

2000

WATER SURFACE PROFILES**BEAVER CREEK**

GLENWOOD CITY, DOWNING
AND BOYCEVILLE
FLOOD HAZARD STUDY
ST. CROIX & DUNN CO'S, WISCONSIN

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed by M. KNABACH

Date _____

Drawn by J. MILLIGAN 6-82

Date _____

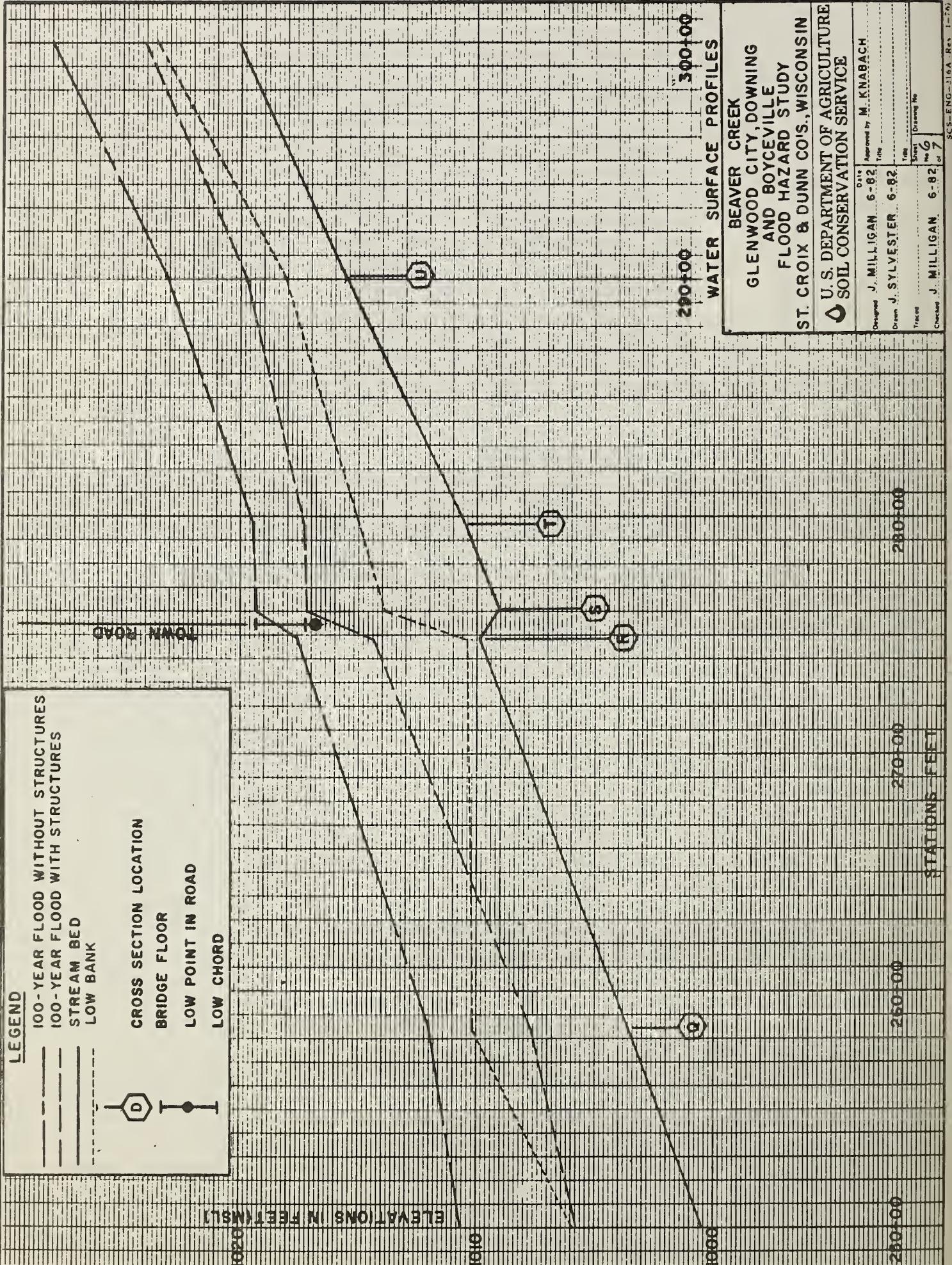
Checked by J. SYLVESTER 6-92

Date _____

Traced by J. MILLIGAN 6-82

Date _____

Sheet No. 5 of 7



LEGEND

- — — — — 100-YEAR FLOOD WITHOUT STRUCTURES
- — — — — 100-YEAR FLOOD WITH STRUCTURES
- — — — — STREAM BED
- — — — — LOW BANK

CROSS SECTION LOCATION
BRIDGE FLOOR
LOW POINT IN ROAD
LOW CHORD



Length = 30 ft (9 m)

1848

1850 ELEVATIONS IN FEET (MSL)

B-25

WATER SURFACE PROFILES

BEAVER CREEK
GLENWOOD CITY, DOWNING
AND BOYCEVILLE
FLOOD HAZARD STUDY
ST. CROIX & DUNN CO'S., WISCONSIN

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Approved by M. KNABACH

Original J. MILLIGAN 6-82 Date

Draft J. SYLVESTER 6-82 Date

Check J. MILLIGAN 6-82 Date

Drawn Drawing No.

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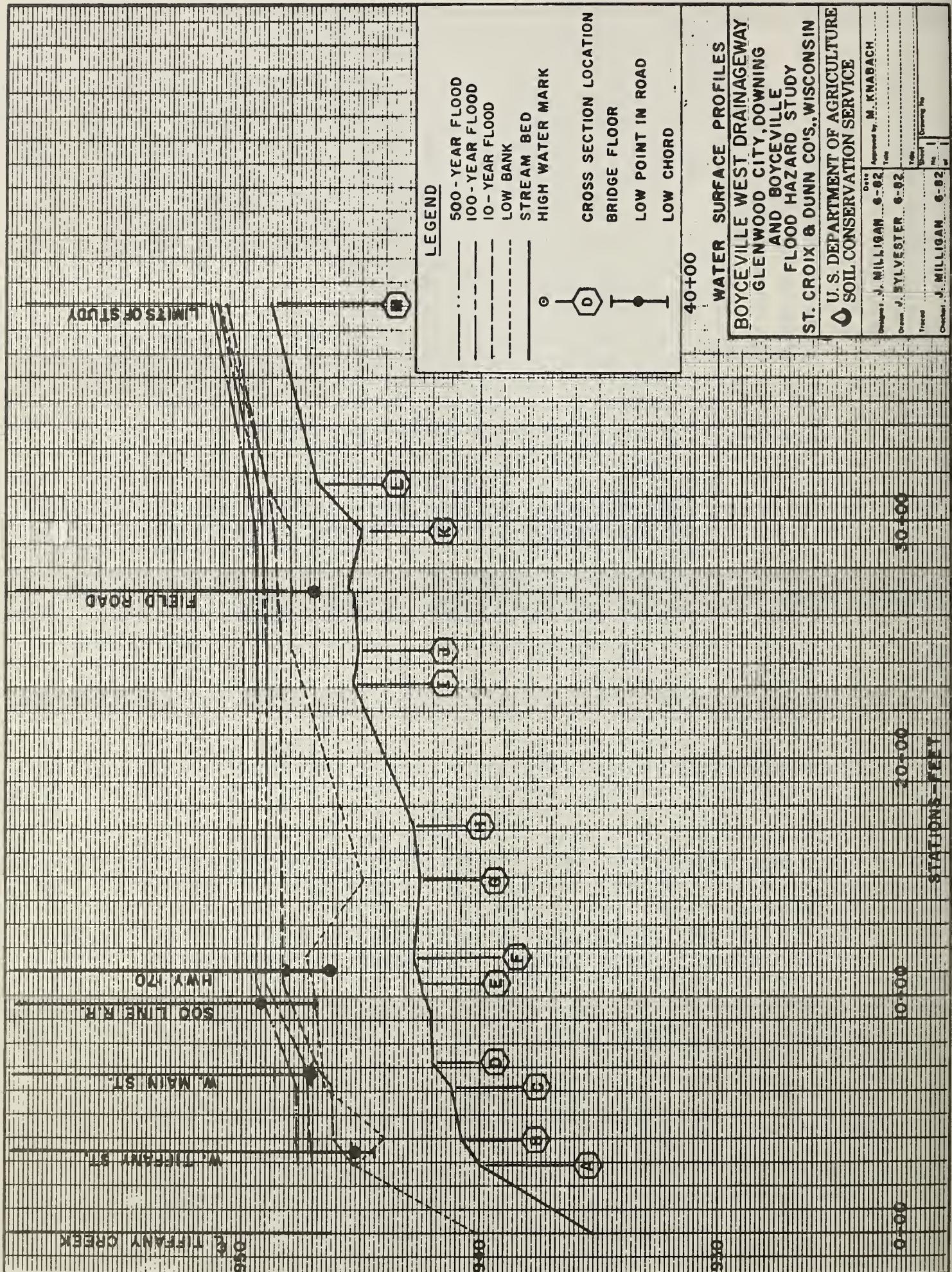
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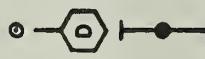
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SCS-ENG-316A (Rev. 1-76)



LEGEND

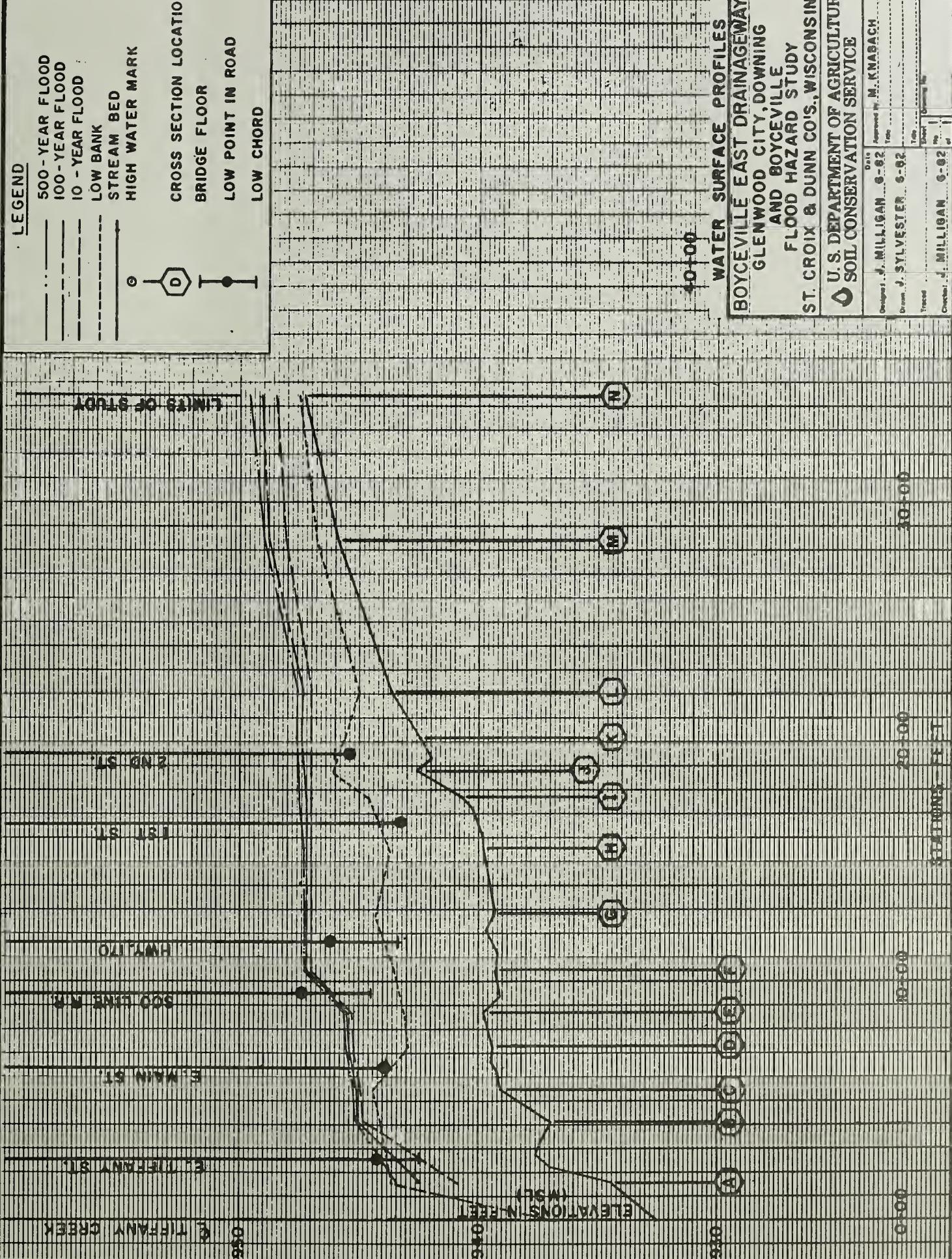
- 500 - YEAR FLOOD
- 100 - YEAR FLOOD
- 10 - YEAR FLOOD
- LOW BANK
- STREAM BED
- HIGH WATER MARK



BRIDGE FLOOR

LOW POINT IN ROAD

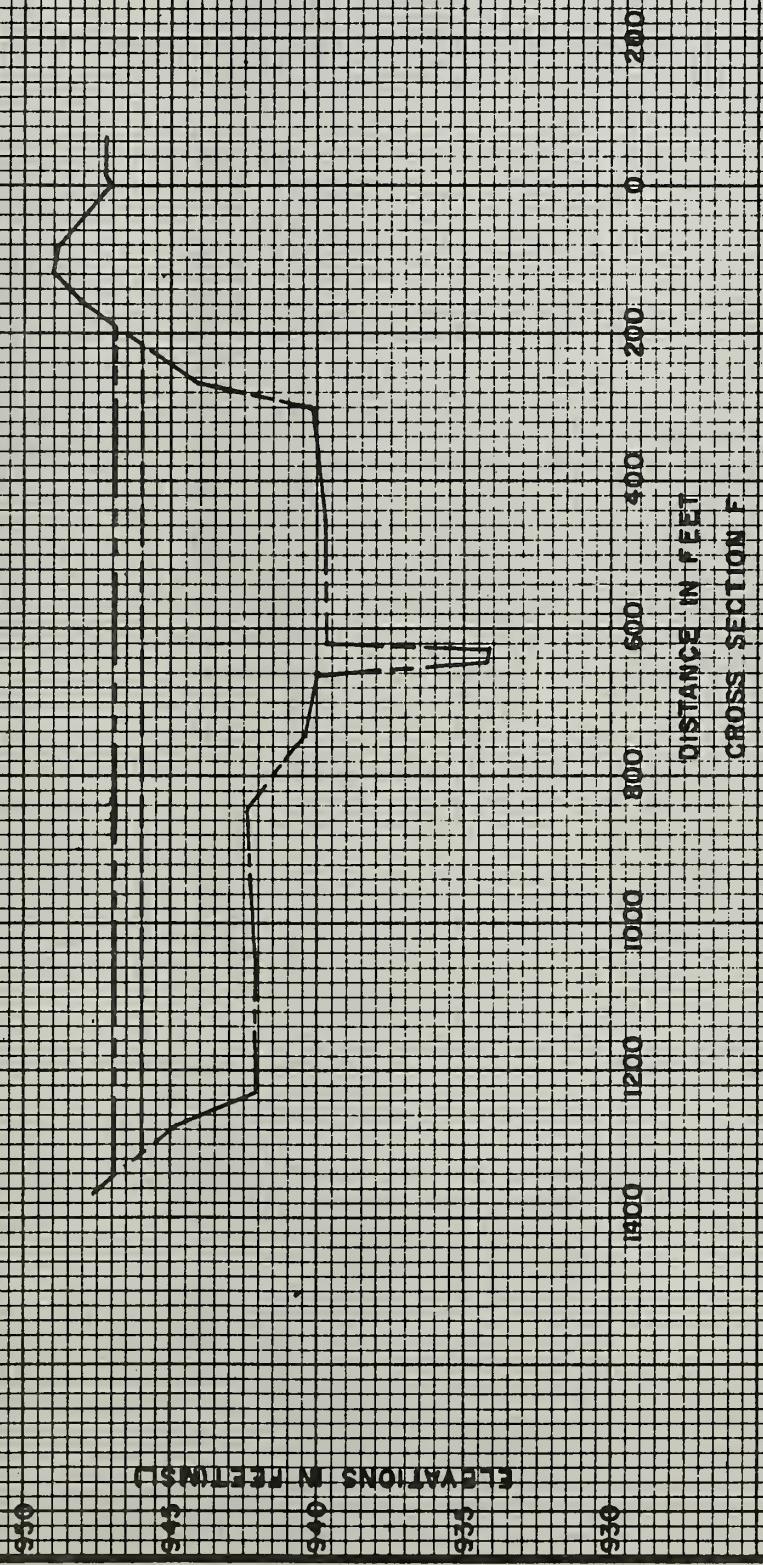
LOW CHORD



Appendix C

TYPICAL SECTIONS





SYNTHETIC POLYMERS

**TIFFANY CREEK
GLENWOOD CITY, DOWNING
AND BOYCEVILLE
FLOOD HAZARD STUDY**

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

APPROVED BY M. KNAABACH
TUESDAY

J. SYLVESTER 6-92

卷之三

J. MILLETTA 6-82

卷之三

LEGEND

- 100 YEAR FLOOD WITHOUT STRUCTURES
 - 100 YEAR FLOOD WITH STRUCTURES
 - GROUND LINE

ELV WATLINGS IN FEET (MSL)

985

980

975

970

965



LEGEND

- 100 YEAR FLOOD WITHOUT STRUCTURES
- 100 YEAR FLOOD WITH STRUCTURES
- GROUND LINE

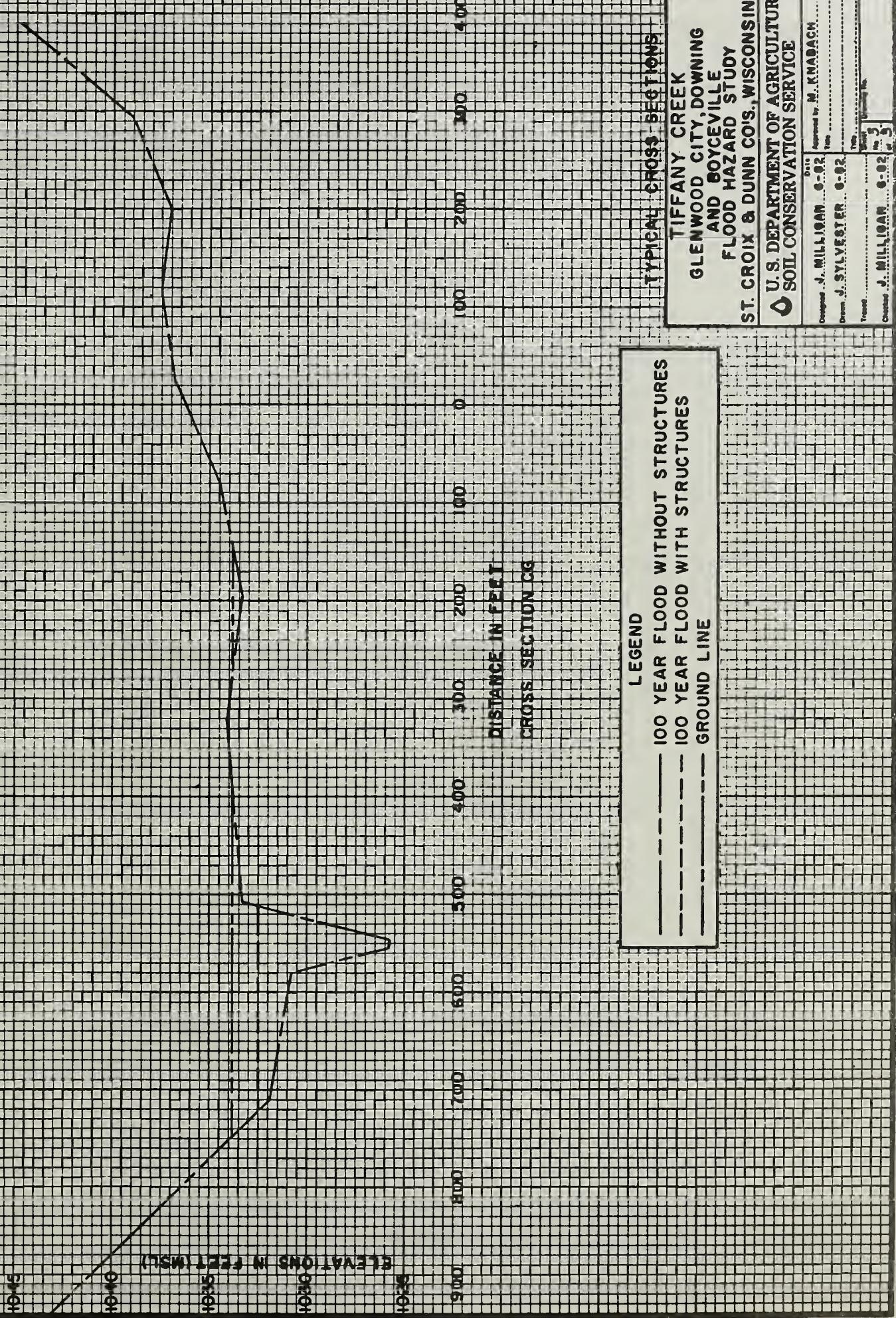
TYPICAL CROSS SECTIONS

TIFFANY CREEK
GLENWOOD CITY, DOWNING
AND BOYCEVILLE
FLOOD HAZARD STUDY
ST. CROIX & DUNN CO'S., WISCONSIN

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Drawn by J. MILLIGAN 6-82 Approved by M. KNABACH
Desig. by J. SYLVESTER 6-82 Title _____
Tent. _____ Date _____
Owner _____ Drawing No. _____

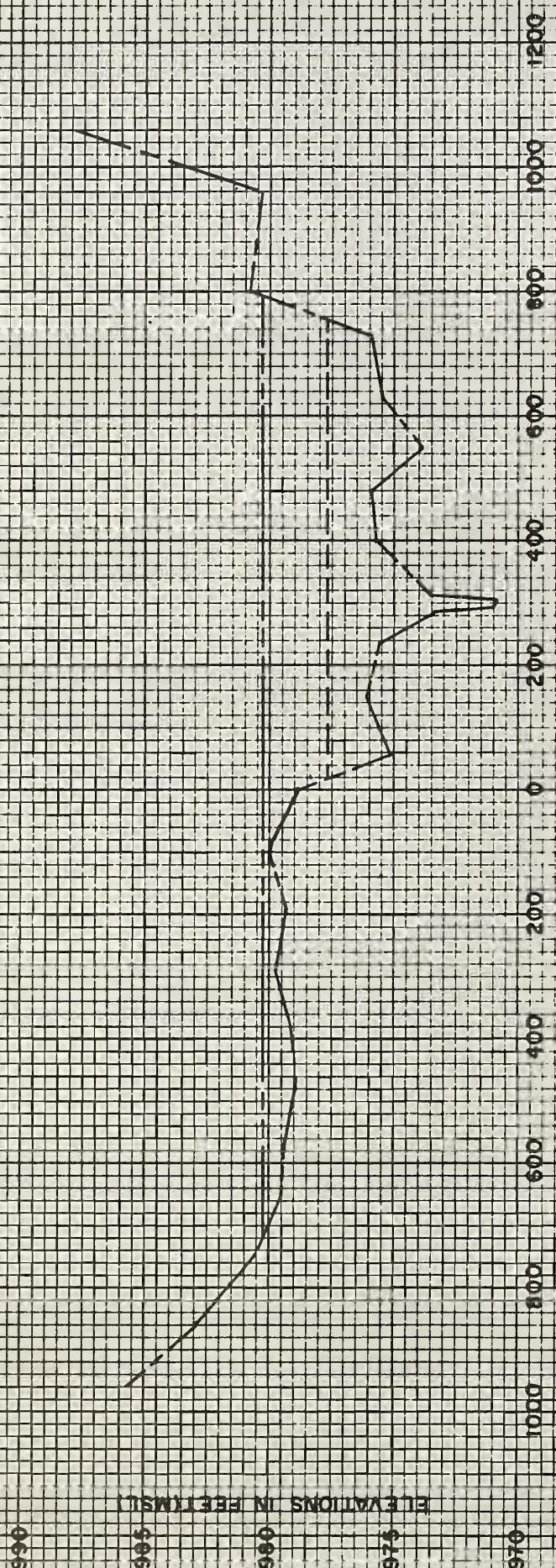
J. MILLIGAN 6-82 Rev. 2
Drawing No. 3



TYPICAL CROSS SECTIONS
TIFFANY CREEK
GLENWOOD CITY, DOWNING
AND BOYCEVILLE
FLOOD HAZARD STUDY
ST. CROIX & DUNN COIS, WISCONSIN
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Approved by M. KNABACH
 Drawn J. MILLIGAN S-92
 Drawn J. SYLVESTER S-92
 Checked J. MILLIGAN S-92

SCENG 315A (J-41)



TOPICAL CROSS SECTIONS
BEAVER CREEK TRIBUTARY
GLENWOOD CITY, DOWNING
AND BOYCEVILLE
FLOOD HAZARD STUDY
ST. CROIX & DUNN COIS., WISCONSIN
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Approved by: M. KNABACH
Date: 6-82

Developed by: J. MILLIGAN
Date: 6-82

Drawn by: J. SYLVESTER
Date: 6-82

Checked by: J. MILLIGAN
Date: 6-82

ELLEVATIONS IN FEET (MSL)

300

300

300

300 LINE R.F.

300 LINE R.F.

300 LINE R.F.

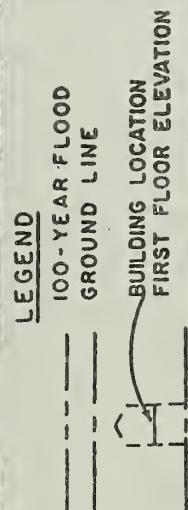
300 LINE R.F.

C-5

0 200 400 600 800 1000 1200 1400 1600 1800 2000 2200

DISTANCE IN FEET

CROSS SECTION 100 FEET WEST OF C. OF CENTER STREET (COTHS)



GLENWOOD CITY, DOWNING
AND BOYCEVILLE
FLOOD HAZARD STUDY
ST. CROIX & DUNN CO'S, WISCONSIN

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Approved by M. KNABACH
Dated 3-83
Drawn J. MILLIGAN
Dated 3-83
Traced J. MILLIGAN
Dated 3-83

Appendix D

LIST OF BENCH MARKS



Elevation Reference Marks

<u>Reference Mark</u>	<u>Elev. (MSL)</u>	<u>Description</u>
1	1068.43	TBM 5-1. Top of upstream end of 3' by 5' pipe arch culvert under CTH "G". (Glenwood City)
2	1044.63	Top of hydrant on west side of Syme Ave. 250' south of centerline of Highway "128". (Glenwood City)
3	1033.00	Crest of weir of sheet piling drop spillway located app. 40' downstream of Syme Ave. (Glenwood City)
4	1041.60	Top of hydrant of NW corner of Clark and Elm Streets. (Glenwood City)
5	1030.95	TBM B-17. Orange paint spot on top of concrete guard rail base at NW corner of bridge over Tiffany Creek at Oak Street. (Glenwood City)
6	1026.435	L-50 at Glenwood City, St. Croix County, 36.7' west of centerline of railroad tracks, 98.6' southwest of SE corner of Midland Co-op Building a standard disk stamped "L 50 1934" and set in the top of a concrete post.
7	1029.11	TBM 6-4. Top of nail with aluminum disc in 24" dia elm tree located 65' west of road centerline and 36' north of the south line of outlot 34, sec. 23, T. 30 N., R. 15 W. (Glenwood City)
8	1019.79	TBM 6-2. Form nail 1' above ground on north side of 28" oak tree on inside of town road curve.
9	995.06	BM-M-50. About 1.2 miles east along the Soo Line railroad from the station at Glenwood City at mile marker 391.9, 49.2' east of the centerline of a road, 49.4' north of the centerline of the track. A standard disk, stamped "M-50 1934" and set in the top of a concrete post.
10	990.75	TBM #11. Top of bolt head in SE corner of top tressel 2' south of tracks and 3' north of sign 391.12 north of sewage treatment pond.
11	988.77	TBM #13. Top of bolt head on NE corner of RR tressel 1' south of barrel in NE corner and 2' north of RR tracks. Main channel of Tiffany Creek. East of sewage pond.

Elevation Reference Marks

<u>Reference Mark</u>	<u>Elev. (MSL)</u>	<u>Description</u>
12	988.84	TBM #14. Top of bolt head in SE corner of top of RR trestle. 1' from east end of trestle and 2' south of RR tracks.
13	983.29	BM N 50. At Downing, Dunn County, about 10 rails (400') west of the west line of the Soo Line Railway Station at a road crossing, about 5 rails (200') east of the centerline of the road, 42' north of the centerline of the main track, and 2' southwest of a pole. A standard disk, stamped "N 50 1934" and set in the top of a concrete post.
14	981.30	TBM 20A. Nail in north face of power pole (2HH7) at junction of CTH "Q" and Hwy. 170 on south shoulder of "170" and on centerline of CTH "Q". Nail is 2.3' above ground.
15	978.87	TBMA-20. Form nail set in west side of power pole, 1st pole south of the Soo Line main track crossing CTH "Q" near Downing.
16	977.47	TBM 21. Top of bolt head, colored red, located in southwest corner of first RR tressel east of CTH "Q" and 1.5' south of track and 1.5' from west end of tressel. (Glenwood City Spur)
17	976.91	TBM 22. Top of bolt head, colored red, located in northeast corner of second RR tressel east of CTH "Q" and 1.5' north of track and 1.5' from east end of tressel. (Glenwood City Spur)
18	979.03	TBM 500. Top of concrete abutment of southwest corner of first railroad bridge east of Cty Q in Downing.
19	974.47	TBM 23. Top of bolt head, colored red, located in northeast corner of third RR tressel east of CTH "Q". (Glenwood City Spur)
20	977.58	TBM 24. Red square on northwest corner of concrete base of railroad semaphore signal. West of town road crossing east of Downing.
21	972.90	TBM 25. Form nail in south side of 4th telephone pole west of railroad crossing east of the cemetery, located 6" off ground. Pole is about 50' north of main track.

Elevation Reference Marks

<u>Reference Mark</u>	<u>Elev. (MSL)</u>	<u>Description</u>
22	965.81	TBM 33A. Form nail 2.5' above ground in power pole located east of Anderson driveway and south of Tiffany Creek.
23	965.24	TBM 33. Nail in west side of power pole which is third one east of intersection of town roads and first one west of log cabin house about 30' south of town road.
24	960.01	TBM 35. Form nail in north side of power pole, 6" above ground located third pole east of transformer pole at intersection of town roads and second pole west of curve in road.
25	957.59	TBM 36. Form nail in west side of telephone pole #10 about 200' east of farm machine shed and 50' from centerline of town road and on fence line.
26	958.91	P-50. About 2.5 miles east along the Soo Line railroad from the station at Downing, Dunn County, about 6 1/2 poles west of milepost 388, at a road crossing, 24' west of the centerline of the road, 44' north of the centerline of the main track, and 12' west of a gatepost. A standard disk, stamped "P50 1934" and set in the top of a concrete post.
27	953.68	TBM 37. Form nail set 0.5' above ground in west side of second power pole north of railroad tracks (Soo Line) approximately 0.25 miles east of mile 388 on Soo Line railroad.
28	952.49	TBM 38. Form nail set in east side, 3" above ground in 12" dia twin bur oak tree, located 15' east of field fence and 300' north of Soo Line tracks.
29	959.36	TBM 39. Top of hydrant located on west side of Duffy Street 100' north of Soo Line tracks.
30	954.84	TBM 40. Top of hydrant on north side of Main Street, 110' east of West Street. (Boyceville)
31	952.82	TBM 41. Top of hydrant on north of Main Street, second hydrant east of West Street. (Boyceville)
32	951.29	TBM 42. Top of hydrant on north side of Main Street, third hydrant east of West Street. (Boyceville)

Elevation Reference Marks

<u>Reference Mark</u>	<u>Elev. (MSL)</u>	<u>Description</u>
33	951.00	TBM 43. Top hydrant on north side of Main Street. First hydrant west of Stanley Street. (Boyceville)
34	950.13	TBM 44. Top of hydrant on north side of Main Street. First hydrant east of Stanley Street. (Boyceville)
35	950.79	TBM 45. Top of hydrant on north side of Main Street. First hydrant east of Ash Street. (Boyceville)
36	950.83	TBM 46. Top of hydrant on NE corner of Center and Main Street. (Boyceville)
37	947.99	TBM 47. Top of fire hydrant SE corner of Tiffany and Center Streets. (Boyceville)
38	950.30	TBM 48. Top of fire hydrant, SE corner of Tiffany and Race Streets. (Boyceville)
39	950.04	TBM 49. Top of fire hydrant, SE corner of Tiffany and Winter Streets. (Boyceville)
40	947.86	TBM 50. Top of fire hydrant, SE corner of Tiffany Street and Hwy. 79. (Boyceville)
41	947.41	TBM 51. Top of fire hydrant located north of intersection of Tiffany and Wilson Streets. (Boyceville)
42	947.00	TBM 52. Top of first fire hydrant east of Wilson Street on the north side of Tiffany Street. (Boyceville)
43	947.11	TBM 53. Top of second fire hydrant east of Wilson Street on the north side of Tiffany Street. (Boyceville)
44	944.83	TBM 54. Top of third fire hydrant east of Wilson Street and on the north side of Tiffany Street. (Boyceville)
45	944.22	TBM 55. Forming nail 1' above ground on east side of power pole. Located at road corner at sewage pump plant. Pole on southeast side of corner. (Boyceville)

Elevation Reference Marks

<u>Reference Mark</u>	<u>Elev. (MSL)</u>	<u>Description</u>
46	942.02	BM R50. About 2 miles east along the Soo Line tracks from the station at Boyceville, Dunn County, 31' east of the centerline of a road, 27' south of the centerline of the main track, and 12' north of a pole. A standard disk, stamped "R50 1934" and set in the top of a concrete post.
47	1027.27	TBM 10-1. Form nail set 6" above ground in east side of power pole. Located approximately 60' upstream of Overolt driveway and 60' left of Beaver Creek.
48	1025.82	TBM 10-2. Form nail set 6" above ground in NW side of power pole. Located in fence line. Third pole downstream from Jim Overolt driveway.
49	1019.40	TBM 10-3. Orange cross on top of left downstream abutment under guardrail. (Bridge on Rustic Road No. 4)
50	1018.95	TBM 10-4. Form nail 6" above ground in west side of power pole with transformer, across road from V. (Benoy driveway)
51	1011.02	TBM 10-4A. NE corner of concrete pump platform. Located in Emil Stang front yard.
52	1011.98	TBM 10-5. Orange mark on top of curb, right upstream corner of bridge on Stang Road, over Beaver Creek.
53	998.59	TBM 10-6. Nail in south side of 18" dia. elm tree. Southernmost tree in row. 900' west of CTH "W" and 670' north of Stang Road.
54	1001.86	TBM 10-7A. State of Wisconsin, Department of Transportation aluminum disc set in concrete on top of southeast end of abutment of bridge located on CTH "W", Beaver Creek.
55	995.26	TBM 10-10. Nail in bottom of west side of first power pole east of intersection of Highways Q and W.
56	981.21	TBM 10-11. Nail in SE side of first power pole south of General Telephone pedestal number 1265, west side of CTH-"W".

Elevation Reference Marks

<u>Reference Mark</u>	<u>Elev. (MSL)</u>	<u>Description</u>
57	954.23	TBM 40A. Form nail in 8" dia. white oak tree, 6" above ground in north side. Tree is 750' west of TBM-40 (RM 30) in railroad right-of-way fence.
58	950.44	Top of first fire hydrant west of Highway "K" south side of Highway "170" (by municipal park). (Boyceville)
59	961.67	Top of second fire hydrant west of Highway "K" south of Highway "170" (Lutheran church). (Boyceville)
60	950.60	Top of first fire hydrant from Highway "170" going south on "K". (Boyceville)
61	949.78	Top of second fire hydrant from Highway "170" going south on "K". (Boyceville)
62	950.40	Top of third fire hydrant from "170" going south on "K" (by Catholic church). (Boyceville)
63	951.80	Top of fourth fire hydrant from "170" going south on "K". (Boyceville)
64	952.42	Top of fire hydrant on east end of north trailer court. (Boyceville)
65	954.58	Top of fire hydrant in south trailer court, 30' south of centerline of John Street on east end of trailer court. (Boyceville)
66	950.01	Top of fire hydrant at the southwest corner of Race and Second Streets. (Boyceville)
67	949.34	Top of fire hydrant at northwest corner of Winter and Second Streets. (Boyceville)
68	950.32	Top of fire hydrant on north side of Second Street between Winter and East Streets. (Boyceville)
69	948.87	Top of fire hydrant at northwest corner of East and First Streets. (Boyceville)
70	943.34	Top of concrete at centerline of middle upstream abutment of bridge on East Main Street. (Boyceville)
71	945.16	Top of concrete on the southeast corner of bridge (bridge on Tiffany West Street). (Boyceville)

Appendix E

**TABULATION OF
WATER SURFACE ELEVATIONS
DISCHARGES**



Flooding Source	Cross-section	Distance ^{1/}	Discharge - Elevation					
			100 - Year - With Structure			100 - Year - Without Structures		
Tiffany Creek			Q - CFS	Elev. - MSL	Q - CFS	Elev. - MSL	Q - CFS	Elev. - MSL
A	6160	9217	938.6	15466	15466	15466	939.4	
B	7810	9217	940.8	15466	15466	15466	942.5	
C	9690	9217	942.5	15466	15466	15466	944.2	
D	10670	9217	943.5	15466	15466	15466	944.9	
E	10740	State Highway 79	9217	945.9	15466	15466	946.6	
F	10790	9217	946.0	15466	15466	15466	946.9	
G	11800	9217	946.3	15694	15694	15694	947.3	
H	12900	8725	947.0	15694	15694	15694	948.5	
I	13710	8725	947.4	15694	15694	15694	949.1	
J	14810	8725	948.4	15694	15694	15694	950.1	
K	15970	8725	949.7	15694	15694	15694	951.5	
L	16930	8725	950.7	15694	15694	15694	952.5	
M	17760	8725	952.0	15694	15694	15694	953.7	
N	18630	Duffy Street	8725	954.2	15690	15690	955.3	
O	18700	8725	955.0	15694	15694	15694	956.5	
P	18750	8725	956.1	15694	15694	15694	957.7	
Q	20700	8725	958.4	15998	15998	15998	959.9	
R	22710	8300	959.4	15998	15998	15998	961.0	
S	24780	8300	960.3	15998	15998	15998	961.6	
T	26040	8300	961.6	15998	15998	15998	963.0	
U	26110	Town Road	8300	961.6	15998	15998	963.0	
V	26160	8300	961.6	R. A. Ebersold Driveway	962.2	15998	963.6	
	28170	8300	961.6					
	28290	8300	961.6					
	28340	R. A. Ebersold Driveway	962.2					
	28390	8300	962.2					

1/ Distance in feet from confluence with Hay River

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
GLENWOOD CITY, DOWNING AND BOYCEVILLE
FLOOD HAZARD STUDY
ST. CROIX & DUNN CO'S., WISCONSIN

TABLE 1

DISCHARGE - ELEVATION DATA

TIFFANY CREEK

Flooding Source	Cross-section	Distance 1/	Discharge - Elevation				
			100 - Year - With Structure			100 - Year - Without Structures	
Tiffany Creek (cont.)			Q - CFS	Elev. - MSL	Q - CFS	Elev. - MSL	Elev. - MSL
W	32710	3300		964.9	15998		966.2
X	34460	8300		966.3	15998		967.7
Y	34510	S. Anderson Driveway					
Z	34560	8300	966.6	15998		968.1	
	35740	8583	967.2	16112		968.7	
AA	36670	8583		967.7	16264		969.2
AB	37910	8583		968.2	16416		969.6
AC	38960	8583		968.3	16492		969.8
AD	39950	8588		969.7	16568		971.1
AE	41990	8588		970.9	16644		972.2
AF	42790	8664		971.6	16720		972.8
AG	43530	8740		972.4	16872		973.6
AH	45900	8816		973.2	16948		974.4
AI	46690	8816		973.9	17024		975.1
AJ	47310	8864		974.9	17084		976.1
AK	48270	8864		975.4	16859		976.7
AL	48330	Soo Line Rail road		975.8	16260		977.9
AM	48390	6700		977.1	5625		978.4
	50310	4068					
AN	50370	County Highway "Q"					
AO	50430	4068		979.4	5625		980.7
AP	50991	4068		979.5	5625		980.8
AQ	52180	4068		979.7	5625		980.9
AR	53520	3450		980.5	6238		981.5
	54845	3450		981.5	6238		982.3

1/ Distance in feet from confluence with Hay River

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
GLENWOOD CITY, DOWNING AND BOYCEVILLE
FLOOD HAZARD STUDY
ST. CROIX & DUNN CO'S., WISCONSIN

TABLE 1

DISCHARGE - ELEVATION DATA

TIFFANY CREEK

Flooding Source	Cross-section	Distance <u>1/</u>	Discharge - Elevation				
			100 - Year - With Structure			100 - Year - Without Structures	
Tiffany Creek (cont.)			Q - CFS	Elev. - MSL	Q - CFS	Elev. - MSL	
AS	55485	3450	State Highway "170"	981.9	6238		982.7
	55565	3450		984.1	6238		985.5
AT	55645	3525		984.2	6300		985.6
AU	56485	3600		984.4	6450		985.7
AV	57430	3675		984.8	6600		986.0
AW	58830	3750	Soo Line Railroad (Glenwood City spur)	985.2	6750		986.3
AX	59670	3750		986.8	6750		987.5
AY	59720	3750		987.0	6750		987.9
AZ	59770						
	60020						
BA	60710	3750		988.4	6750		989.4
BB	60885	4125		989.9	7125		990.3
BC	61236	3918		991.1	7163		991.4
BD	61641	3918		992.1	7163		992.6
BE	62096	3918		993.6	7163		994.2
BF	62493	3918		994.6	7163		995.6
BG	62553	3918		994.7	7163		995.8
BH	63143	3918	Town Road	995.1	7163		996.3
BI	63693	3918		995.6	7163		996.8
	63743						
BJ	63803	3918		996.9	7163		997.7
BK	64303	3593		997.0	6563		997.9
BL	65633	3593		997.4	6563		998.3
BM	66233	3593		998.5	6563		999.4
BN	66783	3593		1000.1	6563		1001.1

1/ Distance in feet from confluence with Hay River

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
GLENWOOD CITY, DOWNING AND BOYCEVILLE
FLOOD HAZARD STUDY
ST. CROIX & DUNN CO'S., WISCONSIN

TABLE 1

DISCHARGE - ELEVATION DATA

TIFFANY CREEK

Flooding Source		Discharge - Elevation					
Cross-section	Distance ^{1/}	100 - Year - With Structure			100 - Year - Without Structures		
Tiffany Creek (cont.)		Q - CFS	Elev. - MSL	Q - CFS	Elev. - MSL	Q - CFS	Elev. - MSL
BO	68023	3593	1001.7	6563	1002.7		
BP	68683	1350	1002.3	2148	1003.1		
BQ	69103	1350	1003.2	2148	1003.9		
BR	69713	1350	1004.6	2148	1005.4		
BS	69973	1350	1007.5	2148	1007.9		
BT	70493	1350	1009.1	2148	1009.6		
BU	70943	1350	1010.4	2148	1011.1		
BV	71543	1343	1013.4	2138	1014.0		
BW	72113	1343	1016.6	2521	1017.3		
BX	72633	1343	1018.9	2521	1019.9		
BY	72673	1343	1019.0	2521	1019.9		
BZ	72773	1343	1019.9	2521	1021.5		
CA	73323	1343	1021.5	2521	1022.6		
CB	73883	1343	1024.8	2521	1025.4		
CC	74353	1343	1027.9	2521	1028.8		
CD	74493	1343	1028.7	2521	1030.7		
CE	74543	Oak Street					
CF	74593	1343	1031.4	2521	1032.7		
CG	74693	1343	1031.5	2521	1032.8		
CH	75143	1343	1032.5	2521	1033.8		
CI	75743	1343	1034.5	2521	1036.1		
	76103	1200	1036.5	2475	1038.3		
CJ	76169	Sym Avenue					
CK	76245	1200	1041.5	2475	1042.2		
	76745	1196	1042.0	2417	1042.9		

^{1/} Distance in feet from confluence with Hay River

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
GLENWOOD CITY, DOWNING AND BOYCEVILLE
FLOOD HAZARD STUDY
ST. CROIX & DUNN CO'S., WISCONSIN

TABLE 1

DISCHARGE - ELEVATION DATA

TIFFANY CREEK

Flooding Source	Cross-section	Distance ^{1/}	Discharge - Elevation		
			100 - Year - With Structure	100 - Year - Without Structures	
Tiffany Creek (cont.)		Q - CFS	Elev. - MSL	Q - CFS	Elev. - MSL
CL	77735	1196	1051.2	2417	1052.0
CM	78395	1196	1057.3	2417	1058.4
CN	79295	534	1062.8	2100	1064.3
CO	79695	534	1067.6	2100	1069.4
CP	79770	County Highway "G"			
CQ	79880	333	1070.9	1310	1071.7
	80080	333	1071.8	1310	1072.7

1/ Distance in feet from confluence with Hay River

TABLE 1

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
GLENWOOD CITY, DOWNING AND BOYCEVILLE
FLOOD HAZARD STUDY
ST. CROIX & DUNN CO'S., WISCONSIN

DISCHARGE - ELEVATION DATA

TIFFANY CREEK

Flooding Source	Cross-section	Distance ^{1/}	Discharge - Elevation					
			100 - Year - With Structure			100 - Year - Without Structures		
Glenhaven Creek			Q - CFS	Elev. - MSL	Q - CFS	Elev. - MSL	Q - CFS	Elev. - MSL
A	885	576	996.8	1398				
	935	576	Soo Line Railroad spur to Glenwood City					997.7
B	995	555	998.2	1398				
C	1585	555	998.4	1341				998.7
D	2235	518	1000.7	1322				999.1
E	2685	463	1003.3	1302				1001.5
F	2845	463	State Highway "170"					1004.2
	4105	426	1005.7	1302				
G	4865	352	1011.6	1283				1007.4
H	4936	352	1014.0	1265				1012.4
I	5017	352	Oak Street					1015.0
J	5147	296	1018.8	1265				
K	6027	241	1018.8	1226				1019.5
			1020.8	1207				1019.5
								1022.1

1/ Distance in feet from confluence with Tiffany Creek

TABLE 1

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
GLENWOOD CITY, DOWNING AND BOYCEVILLE
FLOOD HAZARD STUDY
ST. CROIX & DUNN CO'S., WISCONSIN

DISCHARGE - ELEVATION DATA

GLENHAVEN CREEK

Flooding Source		Cross-section	Distance 1/	Discharge - Elevation					
				100 - Year - With Structure		100 - Year - Without Structures		Elev. - MSL	Q - CFS
Beaver Creek									
A	1680		3350	977.1		7666			977.9
B	1730	Soo Line Railroad spur to Glenwood City	3350	977.4	7666				978.4
C	1900	State Highway "170"	3350	978.1	7660				980.1
D	2085		3520	978.3	7800				980.3
E	2135		3691	978.9	8000				980.7
F	2605		3863	979.9	8200				981.4
G	3395		3978	981.7	8361				983.1
H	5935		4033	984.8	8361				986.5
I	7895	County Highway "Q"	4033	987.2	8361				989.2
J	10855		2247	989.1	7739				991.4
K	10905		1700	990.9	7850				993.0
L	10955		1668	995.4	7956				997.2
M	15095	County Highway "W"	1668	997.8	7410				1002.0
N	17615		1605	998.8	8170				1002.5
O	20135		999	1004.5	7162				1008.3
P	20415	Stang Road	999	1005.6	7162				1010.5
Q	20465		999	1007.7	7162				1012.0
R	21745		999	1014.4	7162				1017.6
S	24665	Town Road (Rustic road no. 4)	1008	1017.2	7162				1019.3
T	24725		1008	1017.3	7400				1019.5
U	24965		882	1019.8	7600				1023.1
	25845		882						
	27485		27545						
	27605		27965						
	27965		29005						

1/ Distance in feet from confluence with Tiffany Creek

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
GLENWOOD CITY, DOWNING AND BOYCEVILLE
FLOOD HAZARD STUDY
ST. CROIX & DUNN CO'S., WISCONSIN

DISCHARGE - ELEVATION DATA

TABLE 1

BEAVER CREEK

Flooding Source		Discharge - Elevation			
Cross-section	Distance <u>1/</u>	100 - Year - With Structure		100 - Year - Without Structures	
Beaver Creek (cont)		Q - CFS	Elev. - MSL	Q - CFS	Elev. - MSL
V	30165	882	1024.8	7800	1028.9
W	32045	882	1031.4	8077	1036.0

1/ Distance in feet from confluence with Tiffany Creek

TABLE 1

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
GLENWOOD CITY, DOWNING AND BOYCEVILLE
FLOOD HAZARD STUDY
ST. CROIX & DUNN CO'S., WISCONSIN

DISCHARGE - ELEVATION DATA

BEAVER CREEK

Flooding Source	Cross-section	Distance 1/	Discharge - Elevation						
			10 year	50 year	100 year	500 year	Q CFS	Elev. MSL	Q CFS
		Boyceville West Drainageway	Q CFS	Elev. MSL	Q CFS	Elev. MSL	Q CFS	Elev. MSL	Q CFS
A	290	West Tiffany Street	249	945.3	281	946.6	296	947.0	314
B	340	West Main Street	249	946.1	281	946.7	296	947.1	314
C	390	West Main Street	249	946.2	281	946.8	296	947.2	314
D	620	Soo Line Railroad	249	946.5	281	947.0	296	947.4	314
E	670	State Highway "170"	393	948.3	620	948.8	752	949.0	1004
F	720	State Highway "170"	393	948.3	620	948.8	752	949.0	1004
G	968	State Highway "170"	393	948.3	620	948.8	752	949.0	1004
H	1057	State Highway "170"	393	948.3	620	948.8	752	949.0	1004
I	1107	State Highway "170"	393	948.3	620	948.8	752	949.0	1004
J	1157	State Highway "170"	393	948.3	620	948.8	752	949.0	1004
K	1497	Field Road	430	948.7	679	949.0	824	949.2	1100
L	1717	Field Road	458	949.0	722	949.3	876	949.4	1170
M	2317	Field Road	458	950.7	722	951.0	876	951.1	1170

1/ Distance in feet from confluence with Tiffany Creek

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
GLENWOOD CITY, DOWNING AND BOYCEVILLE
FLOOD HAZARD STUDY
ST. CROIX & DUNN CO'S., WISCONSIN

DISCHARGE - ELEVATION DATA

BOYCEVILLE WEST DRAINAGEWAY

Flooding Source	Cross-section	Distance ^{1/}	Discharge - Elevation					
			10 year	50 year	100 year	Q CFS	Elev. MSL	Q CFS
<u>Boyceville East Drainageway</u>								
A	155	396	940.9	418	942.0	431	942.5	440
B	250	396	944.8	418	945.0	431	945.0	440
C	410	396	944.9	418	945.0	431	945.1	440
D	550	396	945.2	418	945.3	431	945.4	440
E	640	396	945.3	418	945.4	431	945.4	440
F	729	396	947.0	867	947.1	1116	947.2	1560
G	869	396	947.0	867	947.1	1116	947.2	1560
H	957	396	947.0	833	947.2	1073	947.2	1500
I	1046	494	947.0	833	947.2	1073	947.2	1500
J	1164	494	947.0	833	947.2	1073	947.2	1500
K	1282	475	947.0	761	947.2	980	947.3	1370
L	1552	475	947.0	761	947.2	980	947.3	1370
M	1662	475	947.0	761	947.2	980	947.3	1370
N	1772	434	947.0	761	947.2	980	947.3	1370
O	1882	434	947.0	761	947.2	980	947.3	1370
P	1949	2nd Street	947.0	761	947.2	980	947.4	1370
Q	2016	434	947.0	667	947.2	858	947.4	1200
R	2206	380	947.0	597	948.4	770	948.8	1075
S	2846	340	948.1	597	948.8	770	949.1	1075
T	3446	340	948.5	597				

1/ Distance in feet from confluence with Tiffany Creek

TABLE 1

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
GLENWOOD CITY, DOWNING AND BOYCEVILLE
FLOOD HAZARD STUDY
ST. CROIX & DUNN CO'S., WISCONSIN

DISCHARGE - ELEVATION DATA

BOYCEVILLE EAST DRAINAGEWAY

Appendix F

FLOODWAY DATA



CROSS SECTION	FLOODING SOURCE DISTANCE ¹	DISCHARGE (C.F.S.)	REGIONAL FLOOD		FLOODWAY		
			WITH FLOODWAY ³ (M.S.L.)	WITHOUT FLOODWAY (M.S.L.)	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)
A	6160	9217	939.4	939.4	1254	3853	2.39
B	7810	9217	942.5	942.5	517	2683	3.44
C	9690	9217	944.2	944.2	1264	4169	2.21
D	10670	9217	944.9	944.9	1172	3424	2.69
E	10790	9217	946.6	946.6	1333	7644	1.21
F	11800	9217	946.9	946.9	1103	5173	1.78
G	12900	8725	947.3	947.3	1511	4829	1.81
H	13710	8725	948.5	948.5	662	2792	3.13
I	14810	8725	949.1	949.1	1464	7074	1.23
J	15970	8725	950.1	950.1	971	3695	2.36
K	16930	8725	951.5	951.5	880	2848	3.06
L	17760	8725	952.5	952.5	660	2715	3.21
M	18630	8725	953.7	953.7	809	2651	3.29
N	18750	8725	955.3	955.3	860	4329	2.02
O	20700	8725	956.5	956.5	1110	5600	1.56
P	22710	8725	957.7	957.7	1180	4116	2.12
Q	24780	8300	959.9	959.9	1008	2653	3.13

¹FEET ABOVE MOUTH ²WATER-SURFACE ELEVATIONS WITHOUT STRUCTURES IN PLACE ³FLOODWAY GENERATED
USING FLOOD FLOWS WITH STRUCTURES (DAMS) IN PLACE.

TABLE 1

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
GLENWOOD CITY, DOWNING AND BOYCEVILLE
FLOOD HAZARD STUDY
ST. CROIX & DUNN CO'S., WISCONSIN

FLOODWAY DATA

TIFFANY CREEK

CROSS SECTION	FLOODING SOURCE	DISTANCE ¹	DISCHARGE (C.F.S.)	REGIONAL FLOOD		WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)
				WATER SURFACE ELEVATION ² WITH FLOODWAY ³ (M.S.L.)	WITHOUT FLOODWAY (M.S.L.)			
Tiffany Creek	(cont)			961.0	961.0	1640	3884	2.14
R	26040	8300	961.0	961.6	2186	4909	1.69	
S	26160	8300	961.6	963.0	1985	5379	1.54	
T	28170	8300	963.0	963.0	2080	2763	3.00	
U	28290	9300	963.0	963.0	2250	3916	2.12	
V	28390	8300	963.6	966.2	1050	3148	2.64	
W	32710	8300	966.2	967.7	1265	5000	1.65	
X	34460	8300	967.7	968.1	1280	3900	2.13	
Y	34560	8300	968.1	968.7	1350	4861	1.77	
Z	35740	8583	968.7					
AA	36670	8583	969.2	969.2	1405	4190	2.05	
AB	37910	8583	969.6	969.6	1450	3328	2.58	
AC	38960	8583	969.8	969.8	910	2166	3.96	
AD	39950	8588	971.1	971.1	1000	2908	2.95	
AE	41990	8588	972.2	972.2	1605	4223	2.03	
AF	42790	8664	972.8	972.8	1750	4445	1.95	
AG	43530	8740	973.6	973.6	1400	3251	2.69	

¹FEET ABOVE MOUTH ²WATER-SURFACE ELEVATIONS WITHOUT STRUCTURES IN PLACE ³FLOODWAY GENERATED USING FLOOD FLOWS WITH STRUCTURES (DAMS) IN PLACE.

TABLE 1

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
GLENWOOD CITY, DOWNING AND BOYCEVILLE
FLOOD HAZARD STUDY
ST. CROIX & DUNN CO'S., WISCONSIN

FLOODWAY DATA

TIFFANY CREEK

FLOODING SOURCE		REGIONAL FLOOD			FLOODWAY		
CROSS SECTION	DISTANCE ¹	DISCHARGE (C.F.S.)	WATER SURFACE ELEVATION ² WITH FLOODWAY ³ (M.S.L.)	WITHOUT FLOODWAY (M.S.L.)	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)
Tiffany Creek (cont)							
AH	45900	8816	974.4	974.4	1300	4114	2.14
AI	46690	8816	975.1	975.1	1363	4087	2.16
AJ	47310	8816	976.1	976.1	1077	3750	2.35
AK	48270	8864	976.7	976.7	2334	8699	1.02
AL	48390	6706	977.9	977.9	2335	8727	0.77
AM	50310	4068	978.4	978.4	1482	2699	1.51
AN	50430	4068	980.7	980.7	1521	6053	0.67
AO	50991	4068	980.8	980.8	1417	4870	0.84
AP	52180	4068	980.9	980.9	2237	5743	0.71
AQ	53520	3450	981.5	981.5	2042	3053	1.13
AR	54845	3450	982.3	982.3	1510	2992	1.15
AS	55485	3450	982.7	982.7	1946	3669	0.94
AT	55645	3450	985.5	985.5	1568	3345	1.03
AU	56485	3525	985.6	985.6	2059	4760	0.74
AV	57430	3600	985.7	985.7	2088	5815	0.62
AW	58830	3675	986.0	986.0	1940	3606	1.02
AX	59670	3750	986.3	986.3	1194	1952	1.92

¹FEET ABOVE MOUTH ²WATER-SURFACE ELEVATIONS WITHOUT STRUCTURES IN PLACE ³FLOODWAY GENERATED USING FLOOD FLOWS WITH STRUCTURES (DAMS) IN PLACE.

TABLE 1

FLOODWAY DATA

TIFFANY CREEK

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
GLENWOOD CITY, DOWNING AND BOYCEVILLE
FLOOD HAZARD STUDY
ST. CROIX & DUNN CO'S., WISCONSIN

FLOODING SOURCE		REGIONAL FLOOD				FLOODWAY		
CROSS SECTION	DISTANCE ¹	DISCHARGE (C.F.S.)	WATER SURFACE ELEVATION ²	WITHOUT FLOODWAY (M.S.L.)	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	
Tiffany Creek	(cont)							
AY	59770	3750	987.5	987.5	1457	3901	0.96	
AZ	60020	3750	987.9	987.9	763	2172	1.73	
BA	60710	3750	989.4	989.4	943	2127	1.76	
BB	60885	4125	990.3	990.3	2780	1346	3.69	
BC	61236	3918	991.4	991.4	2683	1782	2.20	
BD	61641	3918	992.6	992.6	2308	1872	2.09	
BE	62096	3918	994.2	994.2	1861	1475	2.66	
BF	62493	3918	995.6	995.6	1424	1558	2.52	
BG	62553	3918	995.8	995.8	1369	5053	0.78	
BH	63143	3918	996.3	996.3	1283	3905	1.00	
BI	63693	3918	996.8	996.8	1085	3238	1.21	
BJ	63803	3918	997.7	997.7	1155	3970	0.99	
BK	64303	3593	997.9	997.9	1040	2812	1.28	
BL	65633	3593	998.3	998.3	1017	2283	1.57	
BM	66233	3593	999.4	999.4	1038	8642	0.42	
BN	66783	3593	1001.1	1001.1	946	1183	3.04	

¹FEET ABOVE MOUTH ²WATER-SURFACE ELEVATIONS WITHOUT STRUCTURES IN PLACE ³FLOODWAY GENERATED
USING FLOOD FLOWS WITH STRUCTURES (DAMS) IN PLACE.

TABLE 1

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
GLENWOOD CITY, DOWNING AND BOYCEVILLE
FLOOD HAZARD STUDY
ST. CROIX & DUNN CO'S., WISCONSIN

FLOODWAY DATA

TIFFANY CREEK

FLOODING SOURCE		REGIONAL FLOOD		FLOODWAY			
CROSS SECTION	DISTANCE 1	DISCHARGE (C.F.S.)	WATER SURFACE ELEVATION 2 WITH FLOODWAY ³ (M.S.L.)	WITHOUT FLOODWAY (M.S.L.)	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)
Tiffany Creek (cont)							
BO	68023	3593	1002.7	1002.7	964	2118	1.70
BP	68683	1350	1003.1	1003.1	792	1231	1.10
BQ	69103	1350	1003.9	1003.9	808	895	1.51
BR	69713	1350	1005.4	1005.4	741	602	2.24
BS	69973	1350	1007.9	1007.9	953	640	2.11
BT	70493	1350	1009.6	1009.6	603	766	1.76
BU	70943	1350	1011.1	1011.1	398	665	2.03
BV	71543	1343	1014.0	1014.0	424	476	2.82
BW	72113	1343	1017.3	1017.3	639	562	2.39
BX	72633	1343	1019.9	1019.9	190	312	4.30
BY	72673	1343	1019.9	1019.9	91	191	7.02
BZ	72773	1343	1021.5	1021.5	420	678	1.98
CA	73323	1343	1022.6	1022.6	460	413	3.25
CB	74883	1343	1025.4	1025.4	376	470	2.86
CC	74353	1343	1028.8	1028.8	217	290	4.63
CD	74493	1343	1030.7	1030.7	52	143	9.37

1FEET ABOVE MOUTH 2WATER-SURFACE ELEVATIONS WITHOUT STRUCTURES IN PLACE 3FLOODWAY GENERATED
USING FLOOD FLOWS WITH STRUCTURES (DAMS) IN PLACE.

TABLE 1

FLOODWAY DATA

TIFFANY CREEK

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
GLENWOOD CITY, DOWNING AND BOYCEVILLE
FLOOD HAZARD STUDY
ST. CROIX & DUNN CO'S., WISCONSIN

CROSS SECTION	FLOODING SOURCE	DISTANCE ¹	DISCHARGE (C.F.S.)	REGIONAL FLOOD		FLOODWAY		
				WITH FLOODWAY ³ (M.S.L.)	WITHOUT FLOODWAY (M.S.L.)	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)
Tiffany Creek (cont)								
CE	74593	1343	1032.7	1032.7	362	54.5	2.46	
CF	74693	1343	1032.8	1032.8	289	59.3	2.27	
CG	75143	1343	1033.8	1033.8	215	35.6	3.77	
CH	75743	1343	1036.1	1036.1	111	23.7	5.66	
CI	76103	1200	1038.3	1038.3	80	24.3	4.95	
CJ	76245	1200	1042.2	1042.2	498	713	1.68	
CK	76745	1196	1042.9	1042.9	545	1195	1.00	
CL	77735	1196	1052.0	1052.0	437	376	3.18	
CW	78395	1196	1058.4	1058.4	104	185	6.46	
CN	79295	534	1064.3	1064.3	153	151	3.53	
CO	79695	534	1069.4	1069.4	643	90	5.90c	
CP	79880	333	1071.7	1071.7	499	936	0.36	
CQ	80080	333	1072.7	1072.7	327	237	1.41	

FEET ABOVE MOUTH 2WATER-SURFACE ELEVATIONS WITHOUT STRUCTURES IN PLACE 3FLOODWAY GENERATED
USING FLOOD FLOWS WITH STRUCTURES (DAMS) IN PLACE.

TABLE 1

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
GLENWOOD CITY, DOWNING AND BOYCEVILLE
FLOOD HAZARD STUDY
ST. CROIX & DUNN CO'S., WISCONSIN

FLOODWAY DATA

TIFFANY CREEK

CROSS SECTION	FLOODING SOURCE	DISTANCE ¹	REGIONAL FLOOD			FLOODWAY		
			DISCHARGE (C.F.S.)	WATER SURFACE ELEVATION ² WITH FLOODWAY ³ (M.S.L.)	WITHOUT FLOODWAY (M.S.L.)	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)
Beaver Creek	A	1680	3350	977.9	977.9	1312	3604	0.93
	B	1900	3350	978.4	978.4	1110	3283	1.02
	C	2135	3350	980.1	980.1	694	2099	1.60
	D	2605	3520	980.3	980.3	756	2316	1.52
	E	3395	3691	980.7	980.7	1300	1982	1.86
	F	5935	3863	981.4	981.4	1685	3661	1.06
	G	7895	3978	983.1	983.1	1941	2428	1.64
	H	10855	4033	986.5	986.5	677	1803	2.24
	I	10955	4033	989.2	989.2	858	2963	1.36
	J	15095	2247	991.4	991.4	768	1760	1.28
	K	17615	1701	993.0	993.0	1156	1457	1.17
	L	20135	1668	997.2	997.2	1024	841	1.98
	M	20465	1668	1002.0	1002.0	975	2066	0.81
	N	21745	1605	1002.5	1002.5	1293	1506	1.07
	O	24665	999	1008.3	1008.3	114	216	4.63
	P	24965	999	1010.5	1010.5	178	421	2.37
	Q	25845	999	1012.0	1012.0	135	227	4.40

¹FEET ABOVE MOUTH ²WATER-SURFACE ELEVATIONS WITHOUT STRUCTURES IN PLACE ³FLOODWAY GENERATED
USING FLOOD FLOWS WITH STRUCTURES (DAMS) IN PLACE.

TABLE 1

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
GLENWOOD CITY, DOWNING AND BOYCEVILLE
FLOOD HAZARD STUDY
ST. CROIX & DUNN CO'S., WISCONSIN

FLOODWAY DATA

BEAVER CREEK

CROSS SECTION	FLOODING SOURCE	DISTANCE ¹	REGIONAL FLOOD			FLOODWAY		
			DISCHARGE (C.F.S.)	WATER SURFACE ELEVATION ² WITH FLOODWAY ³ (M.S.L.)	WITHOUT FLOODWAY (M.S.L.)	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)
Beaver Creek (cont)	R	27485	1008	1017.6	1017.6	64	161	6.27
	S	27605	1008	1019.3	1019.3	712	1307	0.77
	T	27965	882	1019.5	1019.5	478	893	0.99
	U	29005	882	1023.1	1023.1	296	332	2.66
	V	30165	882	1028.9	1028.9	161	159	5.56
	W	32045	882	1036.0	1036.0	223	231	3.82

1FEET ABOVE MOUTH 2WATER-SURFACE ELEVATIONS WITHOUT STRUCTURES IN PLACE 3FLOODWAY GENERATED
USING FLOOD FLOWS WITH STRUCTURES (DAMS) IN PLACE.

TABLE 1

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
GLENWOOD CITY, DOWNING AND BOYCEVILLE
FLOOD HAZARD STUDY
ST. CROIX & DUNN CO'S., WISCONSIN

FLOODWAY DATA

BEAVER CREEK

FLOODING SOURCE		REGIONAL FLOOD				FLOODWAY		
CROSS SECTION	DISTANCE ¹	DISCHARGE (C.F.S.)	WATER SURFACE ELEVATION ² WITH FLOODWAY ³ (M.S.L.)	WITHOUT FLOODWAY (M.S.L.)	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	
Glenhaven Creek								
A	in Floodway	576	998.7	998.7	1130	2393	0.27	
B		555	999.1	999.1	498	910	0.73	
C		518	1001.5	1001.5	619	397	1.32	
D		463	1004.2	1004.2	269	298	1.58	
E		463	1007.4	1007.4	506	578	0.81	
F		426	1012.4	1012.4	481	233	1.85	
G		352	1015.0	1015.0	302	151	2.37	
H		352	1019.5	1019.5	572	1409	0.25	
I		296	1019.5	1019.5	509	826	0.36	
J		241	1022.1	1022.1	197	66	3.73c	
K								

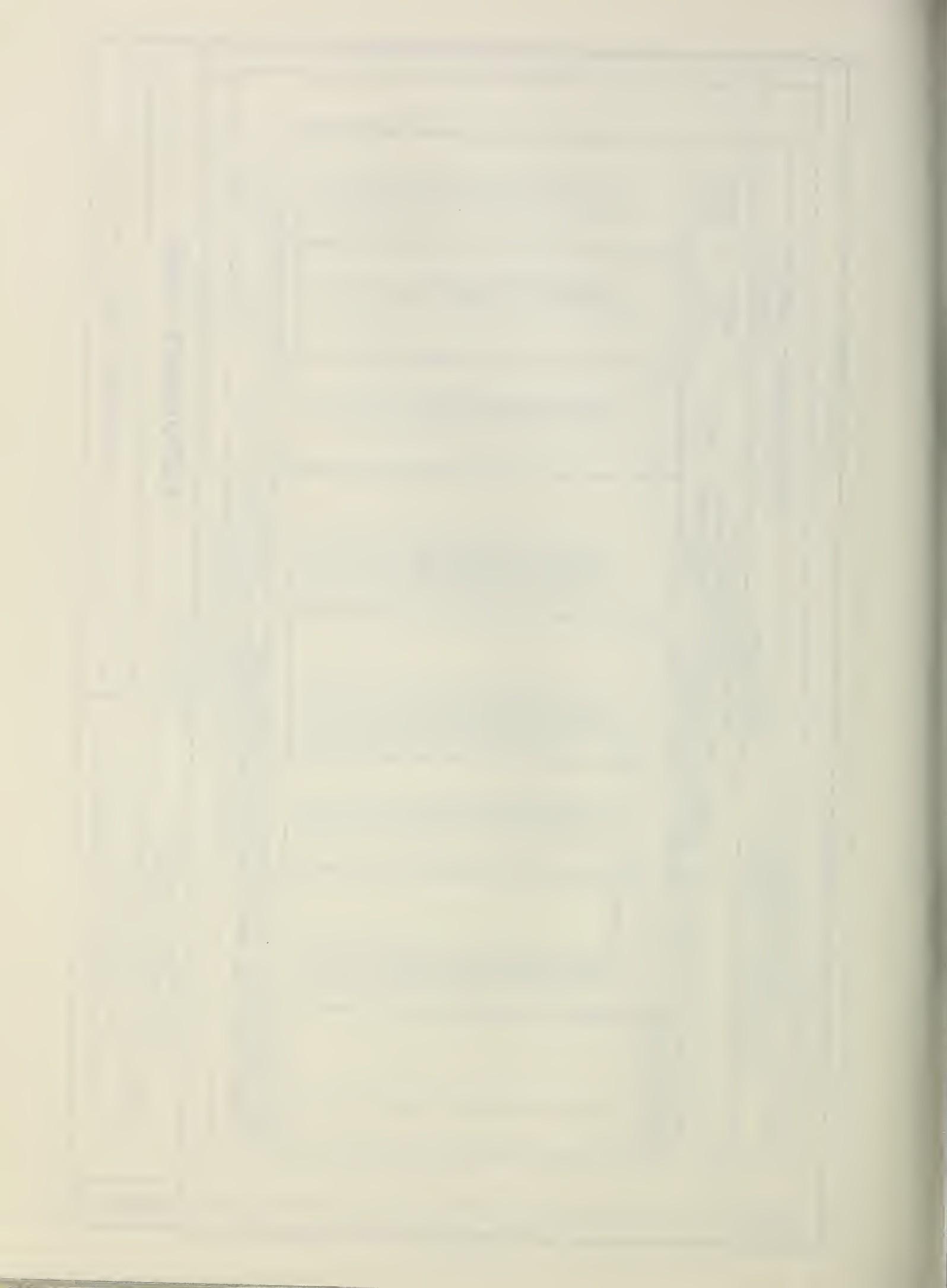
1FEET ABOVE MOUTH 2WATER-SURFACE ELEVATIONS WITHOUT STRUCTURES IN PLACE 3FLOODWAY GENERATED
USING FLOOD FLOWS WITH STRUCTURES (DAMS) IN PLACE.

TABLE 1

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
GLENWOOD CITY, DOWNING AND BOYCEVILLE
FLOOD HAZARD STUDY
ST. CROIX & DUNN CO'S., WISCONSIN

FLOODWAY DATA

GLENHAVEN CREEK



Appendix G

INVESTIGATIONS AND ANALYSIS



Investigation and Analysis

Glen Hills watershed was modeled in the early 1960's. Six-hour duration rainfalls were used to compute runoff, peak flows, and volumes, which in turn were graphically routed through the stream system manually. It was decided to remodel the watershed using the computer program, "Computer Program for Project Formulation, Hydrology - SCS TR 20." The presently accepted 24-hour storm rainfalls were used utilizing the Type II rainfall distribution. All the original subwatersheds were used and all existing structures were flood routed. See table G-1 for a summary of the structure routings. The structures create a 42 percent reduction in the flood peaks at the outlet to the watershed. The 100-year peak flow without the structures is 15,500 cubic feet per second and 9,100 cubic feet per second with the structures in place. Two water surface profiles were run, one with the structures in place and one with the structures removed. The two profiles with their related flood plains were presented to the city, county, and state officials. It was agreed, based on the fact the county has a limited maintenance agreement on the structures, that the flood plain resulting from the floodflows with the structures in place would be regulated as the floodway.

The difference between the flood plain with structures and the flood plain without the structures would be regulated as flood fringe. This would provide protection for the property owners should the dams be removed. The only exception would be the two drainageways in Boyceville where there are no structures to reduce the flooding. The 100-year regional flood plain is shown for these drainageways.

The floodway and flood plains are shown on the photomaps in appendix A. The photomaps also show the location of the valley cross sections, used to generate the water surface profiles plotted in appendix B, as well as the locations of the reference marks used to perform the engineering surveys. The water surface profile elevations were generated using the computer program "WSP2 Computer Program, Technical Release No. 61."

The tabulated values for the floodway are listed in Appendix F.

Structure No.	Principal Spillway Design Frequency and Duration	Antecedent Moisture	Structure Hazard Class Design	Structure Hazard Class as revised	Emergency Spillway Crest Elev.	Top of Dam Crest Elev.	Regional Flood Crest Elev.	Difference* Regional Flood & Top of Dam Emergency Crest ft.
					MSL	MSL	MSL	
1	25yr 6hr	$\frac{II + III}{2}$	a	a	1115.0	1117.5	1116.2	+ 1.2 - 1.3
2	25yr 6hr	$\frac{II + III}{2}$	a	a	1118.1	1120.8	1119.2	+ 1.1 - 1.6
3	25yr 6hr	$\frac{II + III}{2}$	a	a	1096.6	1099.6	1097.6	+ 1.0 - 2.0
4	41.67yr 6hr	$\frac{II + III}{2}$	$\frac{a+b}{2}$	c	1119.5	1123.5	1120.4	+ 0.8 - 3.1
5	41.67yr 6hr	$\frac{II + III}{2}$	$\frac{a+b}{2}$	c	1099.5	1103.5	1100.0	+ 0.5 - 3.5
6	50yr 1/10 day	II	b	b	1042.3	1046.8	1040.9	- 1.4 - 5.9
7	25yr 1/10 day	II	a	b	1099.5	1102.5	1099.7	+ 0.2 - 2.8
8	25yr 1/10 day	II	a	a	1103.0	1106.5	1103.3	+ 0.3 - 3.2
10	50yr 6hr	$\frac{II + III}{2}$	a	c	1080.0	1090.0	1080.6	+ 0.6 - 9.4
11	25yr 1/10 day	II	a	a	1039.6	1043.6	1040.7	+ 1.1 - 2.9

* A "+" indicates the regional flood is above the emergency spillway crest elevation. A "-" means the regional flood is below the emergency spillway crest elevation or top of dam.

Table G-1 Summary of Structure Routings

Appendix H

GLOSSARY

GLOSSARY

CHAPTER NR. 116, WISCONSIN'S FLOOD PLAIN MANAGEMENT PROGRAM NR. 116.03 DEFINITIONS

Channel. A channel is a natural or artificial watercourse with definite bed and banks to confine and conduct the normal flow of water.

Department. Department refers to the State of Wisconsin Department of Natural Resources.

Encroachment. An encroachment is any fill, structure, building, use, accessory use, or development in the floodway.

Encroachment/Floodway Lines. Encroachment/floodway lines are limits of obstruction to floodflows. These lines are on both sides of and generally parallel to the river or stream. The lines are established by assuming that the area landward (outside) of the encroachment/floodway lines will be ultimately developed in such a way that it will not be available to convey floodflows.

Equal Degree of Hydraulic Encroachment. The effect of any encroachment into the floodway must be computed by assuming an equal degree of hydraulic encroachment on the other side of a river or stream for a hydraulic reach. This computation assures that property owners up, down, or across the river or stream will have the same rights of hydraulic encroachment. Encroachments are analyzed on the basis of the effect upon hydraulic conveyance, not upon the distance the encroachment extends into the floodway. Also see: Hydraulic Reach.

Flood. A general and temporary condition of partial or complete inundation of normally dry land areas caused by the overflow or rise of rivers, streams, or lakes.

Flood Frequency. The term flood frequency is a means of expressing the probability of flood occurrences and is generally determined from statistical analyses. The frequency of a particular floodflow is usually expressed as occurring, on the average, once in a specified number of years. Any particular floodflow could, however, occur more frequently than once in any given year.

Flood Fringe. The flood fringe is that portion of the flood plain outside of the floodway, which is covered by floodwaters during the regional flood; it is generally associated with standing water rather than rapidly flowing water.

Flood Plain. The flood plain is the land which has been or may be hereafter covered by floodwater during the regional flood. The flood plain includes the floodway and the flood fringe.

Flood Plain Management. Flood plain management involves the full range of public policy and action for insuring wise use of flood plains. It includes everything from the collection and dissemination of flood control information to actual acquisition of flood plain lands; and the enactment and administration of codes, ordinances, and statutes for land use in the flood plain.

Flood Proofing. Flood proofing involves any combination of structural provisions, changes, or adjustments to properties and structures subject to flooding, primarily for the purpose of reducing or eliminating flood damage to properties, water and sanitary facilities, structures and contents of buildings in flood hazard areas.

Flood Protection Elevation. The flood protection elevation shall correspond to a point 2 feet of freeboard above the water surface profile associated with the regional flood and the official floodway lines. Also see: Freeboard.

Floodway. The floodway is the channel of a river or stream and those portions of the flood plain adjoining the channel required to carry and discharge the floodwater or floodflows associated with the regional flood.

Freeboard. Freeboard is a factor of safety usually expressed in terms of a certain amount of feet above a calculated flood level. Freeboard compensates for the many unknown factors that contribute to flood heights greater than the height calculated. These unknown factors include, but are not limited to, ice jams, debris accumulation, wave action, obstruction of bridge openings and floodways, the effects of urbanization on the hydrology of the watershed, loss of flood storage areas due to development and aggradation of the river or streambed.

High Flood Damage Potential. High flood damage potential is associated with any danger to life or health and any significant economic loss to a structure or building or its contents.

Hydraulic Floodway Lines. Hydraulic floodway lines shall delineate the channel of the river or stream and those portions of the adjoining flood plains which are reasonably required to carry and discharge the regional floodflow without any measurable increase in flood heights.

Hydraulic Reach. A hydraulic reach along a river or stream is that portion of the river or stream extending from one significant change in the hydraulic character of the river or stream to the next significant change. These changes are usually associated with breaks in the slope of the water surface profile, and may be caused by bridges, dams, expansion and contraction of the waterflow, and changes in streambed slope or vegetation.

Levee. A levee is a continuous dike or embankment of earth constructed parallel to a river or stream to prevent flooding of certain areas of land.

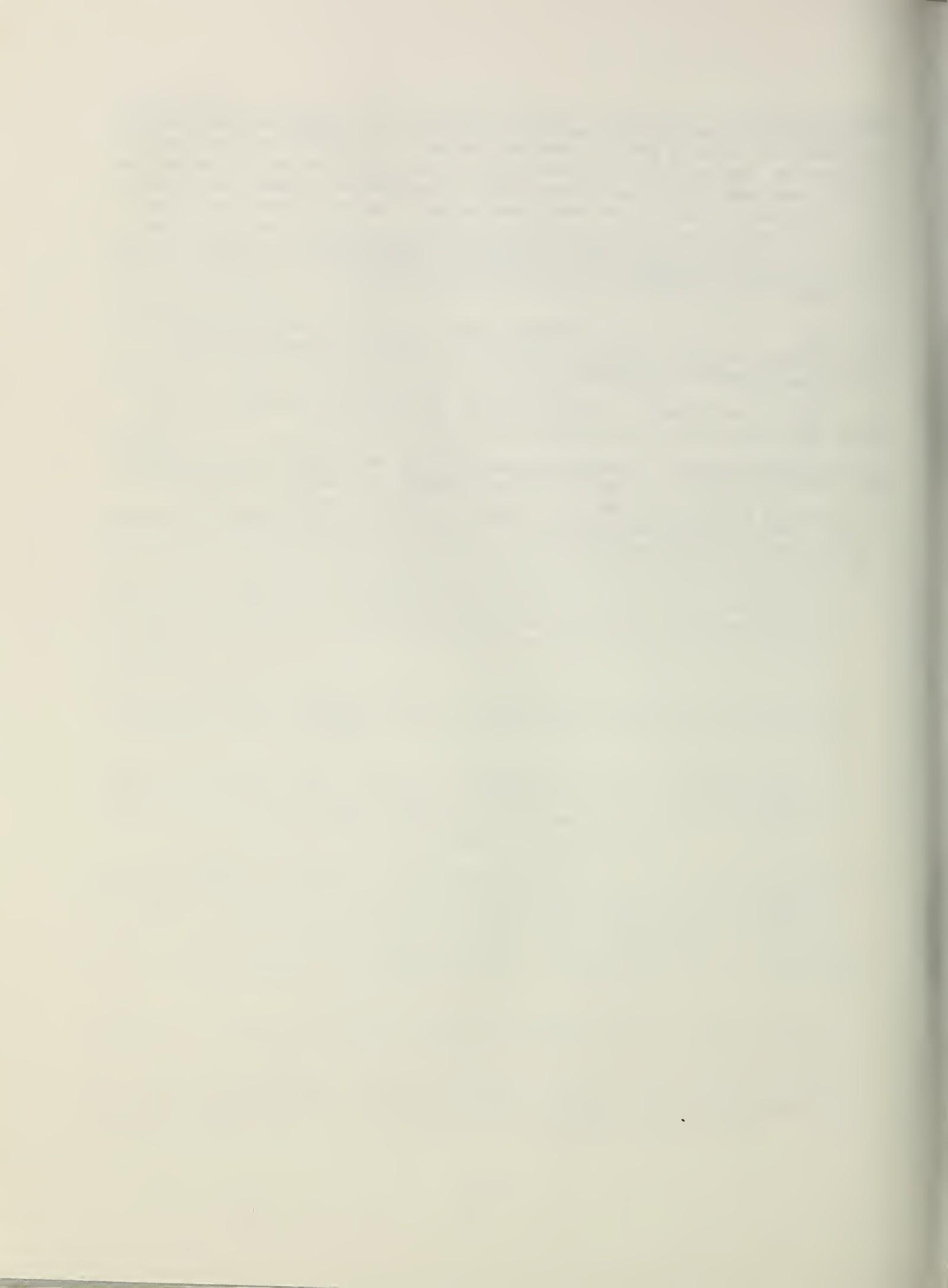
Official Floodway Lines. Official floodway lines are those lines which have been adopted by the county, city, or village, approved by the department, and which are shown on the official flood plain zoning maps and used for regulatory purposes.

Regional Flood. The regional flood is a flood determined to be representative of large floods known to have generally occurred in Wisconsin and which may be expected to occur on a particular stream because of like physical characteristics. The regional flood is based upon a statistical analysis of streamflow records available for the watershed and/or an analysis of rainfall and runoff characteristics in the general watershed region. The flood frequency of the regional flood is once in every 100 years; this means that in any given year there is a 1 percent chance that the regional flood may occur. During a typical 30-year mortgage period, the regional flood has a 26 percent chance of occurring.

Structure. A structure is any manmade object with form, shape, and utility, either permanently or temporarily attached to or placed upon the ground, riverbed, streambed, or lakebed.

Watershed. A watershed is a region or area contributing ultimately to the water supply of a particular watercourse or body of water.

Water Surface Profile. The water surface profile is a graphical representation of the height of the water surface throughout a county, city, or village based upon a certain flow passing through the river or stream. A water surface profile based upon flows occurring during a regional flood is used in regulating the flood plain areas.

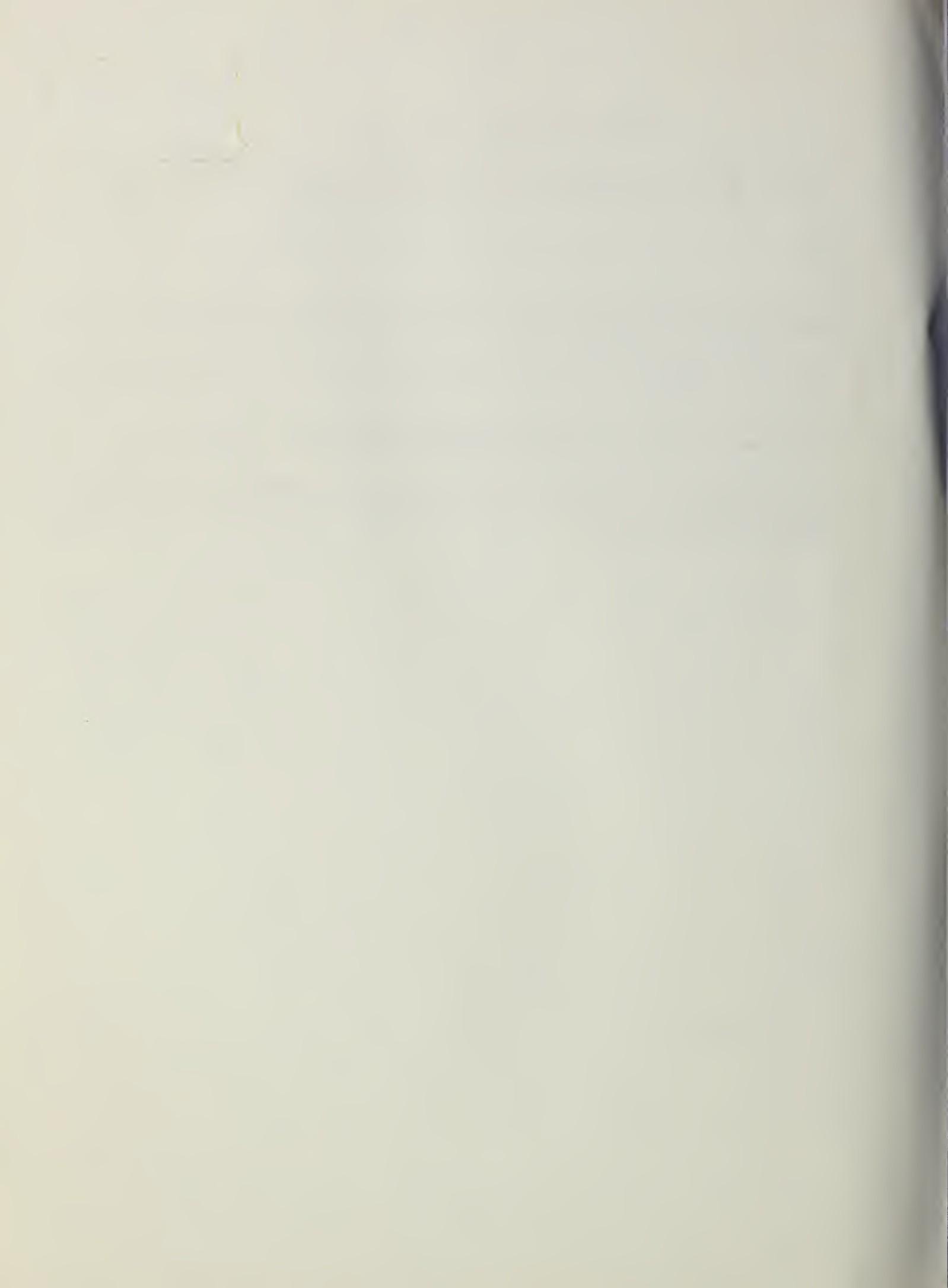


Appendix I

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